THE METAL INDUSTRY
WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD, THE BRASS FOUNDER AND FINISHER, THE ELECTRO-PLATERS REVIEW, COPPER AND BRASS
A TRADE JOURNAL RELATING TO METALS AND ALLOYS

OLD SERIES. Vol. 19. No. 6. | NEW YORK, JUNE, 1913. | NEW SERIES. Vol. 11. No. 6.

SILVER: ITS EXTRACTION, STRUCTURE, AND NOVELTY

THE FIFTH OF A SERIES OF ARTICLES DESCRIBING THE PROPERTIES OF SOME OF THE METALS IN EVERY DAY USE.

BY JAMES SCOTT.

Silver is found native in the form of cubic crystals, fibrous masses, and also as a sulphide, chloride, and bromide. Sometimes it may occur as an alloy with lead, copper, and mercury. Its chief compound is, however, sulphide of silver (i. e., argentite); although it is often allied with the sulphide of antimony, being then called stephanite, or brittle ore. Pyrargarite, or ruby silver, is another formation of the same thing.

The ore known as horn-silver is the chloride. Galena, which is lead sulphide ore, and pyrites yield a fairly large

Fig. 1. Native silver from South America seen through a magnified pinhole.

quantity of the metal. Silver glance is the sulphide of silver. Native fibrous silver is shown in No. 1. North and South America, and Australia are the principal silver producing countries.

There are three methods for the production of silver, these being amalgamation, solution, and smelting. One of the oldest processes is that known as the Mexican or Patio one. The ore is very finely ground, and spread out over a large circular paved space. Salt is then mixed with it, and mules or horses continually treat the mixture. When well incorporated it is roasted, and copper pyrites (i. e., chalcopyrites) or else magistral is added. Mercury is then compounded with it, and the resulting amalgam removed, washed and dried. The mercury is then distilled off, leaving the silver behind in an isolated, yet still impure condition. For the alternative or Washoe process the crushed ore is stamped to powder, and then put, in a wet state, into cast-iron pans fitted with revolving mullers. Mercury is then added to the pulpy mass to form an amalgam, the pan being meanwhile steam heated. The silver is displaced by the iron, and when freed unites with the mercury. Ores of a refractory character are roasted along with salt before passing through the treatment just described.

When about to be extracted by solution, of which there are three important methods, the crushed ores are mixed

Fig. 2. The moment that copper is dropped into a solution of silver nitrate, pure silver is extracted therefrom and is deposited in tufts of exquisite form. A magnified pinhole, showing silver depositing round a farthing.

with common salt (*i. e.*, chloride of sodium). In the practice founded by Augustine, argentiferous mattes are mostly employed. Roasting causes the crushed ore to lose its sulphur, whereupon it is ground again and re-roasted with 5 per cent of salt to form chloride of silver. It is then treated with a hot salt solution to dissolve the silver chloride, from which the silver is precipitated by means of copper. In the Ziervogel preparation, used chiefly on copper matte containing silver, the substance is roasted for the development of silver sulphate, which is leached out and precipitated. The roasting changes the sulphide into silver sulphate, and after this is dissolved out, the silver is precipitated with copper.

In the modified Patio method the chloride of silver is dissolved in this sulphate of soda or lime, and is precipi-

tated by sulphide of soda. Upon roasting the silver sulphide the silver is set free. Smelting is only resorted to in connection with the richer classes of ores, such as when it exists with lead sulphide, or galena. The reduced lead carries the silver, which is then separated by either the Pattison's or Parke's process. Both of these were briefly described in the article on lead. Pattison's process is useful when the silver constitutes as little as 1/5000 part by weight of the leaden mass.

Copper mattes and sulphides can be used to collect the silver instead of employing lead, the ore being smelted in a blast or reverberatory furnace (as in the case of copper) and the matte being afterwards separated from the siliceous slag. It is then roasted awhile to concentrate it, and afterwards fused. The silver is then extracted by means of acid, by melted lead, or by the Ziervogel process. From lead sulphide ore containing silver, the latter may be removed after roasting and smelting with charcoal—the silver being afterwards separated on a hearth or cupel composed of bone ash, heated in air. Experimentally, silver may be obtained from the nitrate by heating a small quantity of the latter with charcoal before a blow pipe.

Metallic silver can be extracted from the nitrate by means of copper. A very pretty spectacle is possible in demonstration of this fact. Dissolve a small piece of the white salt in water on a glass slide, and then lay a farthing in contact with the liquid. *Immediately*, from the edge of the coin, tufts of *pure* silver will rapidly "grow," until the whole field of view is completely filled with tree or fernlike forms of glittering beauty. The

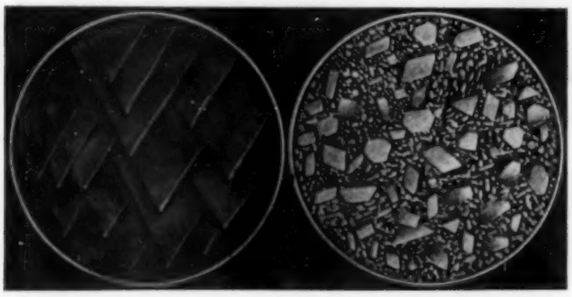


Fig. 3. Magnified pinholes. In the first is shown the crystalline surface of a piece of pure smooth silver modified by burning sulphur. In the second, the same thing is depicted after being roasted with salt.

reader has only to continue the curve shown in No. 2 around to the right and to the left, until a large circle is composed, to comprehend the scale of magnification adopted, since the enlarged disc will represent a magnified farthing. A small coil of wire, or even a straight piece, will also prove satisfactory for this experiment. Silver melts at 962° C. and becomes volatile at very high temperatures. As readers know, it is the best ordinary metal for electrical and heating purposes. Neither pure air nor water will affect the metal. It will, however, readily absorb oxygen when melted in air; and this gas is vigorously cast out again when the metal is allowed to cool. Sulphur and its fumes readily blacken or color silver, thereby forming a sulphide. In this connection the illustrations Nos. 3 and 4 may prove interesting.

I heated a scrap of pure sheet silver, about half an inch long, in a pinch of burning sulphur on a glass slide. At the end of the experiment the silver had blackened and divided into two or three smaller pieces. Upon magnifying the result I found numerous tiny particles of modified silver of peculiar filigree shapes, of the kind shown in No. 4 scattered about, while the edges of the larger parts were of more geometrical character. The surface of the metal was brilliantly speckled, owing to the reflection of light from the crowds of upstanding points of these forms with which it was covered. Light is here coming from below only. The underside of the blackened silver was less dense, and appeared as shown in No. 3 first circle, where light was shed *upon* it, throwing up the crystals in dazzling brilliance. What had been plain silver sheet was altered, by means of sulphur, within five minutes to a beautiful cluster of regular, well-defined crystals. I next coveted the scrap of silver sulphide with common salt (the glass slide containing it was laid over a ladle) and then roasted it. At the end of the operation it had been converted into a brittle grayish or slatey substance, which, upon magnification, disclosed a dull surface divided and ridged in the curious manner shown in No. 3, right circle.

Silver may be brought to a colloidal, hygroscopic condition in contradistinction to the crystalline state, by dissolving it in alkaline solutions. These, when dry, become colored masses.

Silver will remain white with as much as one-quarter of copper as an alloy, but beyond this amount the copper causes it to assume a yellowish or reddish color. The standard silver for coinage consists of 9¼ parts of silver with ¾ parts of copper. If a coin is heated in a dilute solution of nitric acid the resulting blueness in the liquid

Fig. 4. When a piece of silver is heated in burning sulphur it turns black. Upon magnifying it there are found detached particles of the above shapes. The edges of the pieces are boldly outlined. A magnified pinhole.

will denote the presence of the copper. It is owing to the fact that silver salts are darkened by exposure to light that the art of photography has been possible. We have only to reflect upon the enormous strides made by press illustration, which mostly depends on the camera in the first place, to become aware that without silver—which by combination becomes the silver chloride, bromide and so on—the world would have been a great loser. By the way, my own work always consists of drawings in Indian ink and Chinese white, done with brush and pen. It is impossible to properly photograph the objects that I have illustrated in my articles. Many of them have, indeed, never before been dealt with in this way. At the same time these drawings could not be so faithfully *reproduced* in this magazine if they were not photographed onto the printing blocks, so that even I and all other black and white artists would be of little use if no silver existed.

BEARING METAL

An Interesting Article on Anti-Friction Metals, Written by a Practical Man.

By A. P. Wright.*

Perhaps too little has been published with regard to the manufacturing of babbitt metals and their use. Articles which I have read from time to time have all been written by men of professional metallurgical skill and worked out by theories rather than from practice.

What I have to say is from a practical point of view, as a layman with twenty years experience among the various metals used in the making of bearing alloys. I am often asked, "What is babbitt, and what is it used for?" by men of all classes, most of whom you would naturally think had familiarized themselves with knowledge in regard to this all important part of a machine. In most cases the thought goes out that babbitt is a mineral mined out of the ground, like any other metal, treated in such a way as to make it an article of commerce.

Babbitt metal or bearing metal (the latter term I like best, for it covers in a broader sense all that the word implies), is used on machinery parts to reduce friction, and also to reduce the cost of repairing, by enabling these parts to be removed and replaced quickly and cheaply. There are four metals which are used extensively in the alloying of bearing metals, namely, lead, tin, antimony and copper. While there are many metals used in addition to these their per cent. is so small that the results are not necessary in the formula of a well balanced metal. A small addition of nickel, aluminum, phosphorus silica, manganese or bismuth, any one of these metals, which some manufacturers claim to use, would not affect its bearing qualities any. I could find no reason for putting them in a mixture, and could see no real results obtained by adding them. However one good result obtained is by the addition of about ¼ pound of phosphorus tin to the 1,000 pounds in all lead base babbitts, as it makes it run smoothly, drives out the oxygen in the metal, and solidifies the mass, making a close grain and leaves a better skin on the surface of the metal.

Some time ago I met a man who was selling babbitt metal, representing that he had a graphite babbitt, and to prove his assertion he took a piece and wrote his name with it to demonstrate there was really graphite in it. I also took a piece of pure lead and wrote my name even plainer than his. Anyone ought to know that lead bearing metal will write, and that it isn't any more possible to mix graphite with metal than to mix water and oil. Sometimes I think that the pure food law ought to extend to the manufacturing of all alloys. If that were so the honest manufacturers of various metals would stand an equal show in the field of competition, and not many persons or firms would dare to mislabel their goods in order to sell them at a price which would mean a loss if they really contained all that they should.

Another important matter which the users of metal should consider is that there is lots to be done besides the mere mixing of any three of the above-named metals, namely, lead, tin, antimony; tin, antimony, copper. If tin is the base copper should be used, but if lead is the base no copper is needed, although in some cases a small per cent. of copper is used. The copper should be reduced by melting in a crucible, a small percentage of tin being used, to bring down the heat quickly, and poured over into the mixture while hot, stirring it into the metal as you pour. Antimony broken into small pieces will melt more quickly, aiding it by sprinkling a small portion of powdered sal ammoniac on the surface. The careful mixing of metals, the heat required (so that the metal is poured at the right temperature), the length of time required to cook the metal, and the quickness the ingots or bushings can be poured after the metal is prepared are very necessary considerations.

Many firms who buy metal on formula think that the price of babbitt ought to be regulated by the raw material you put in. They do not think of the extra care you give your metal, which costs you money and adds to its protection. For instance, you receive an inquiry for price on 1,000 pounds of metal of the following formula: Lead 100, antimony 17, tin 6. If you quote your price with the additional cost of producing the metal as it should be made, very likely you will not get the order. If your customer is fair he will tell you that your figures are higher than your competitor's and he wants to know why there is such a difference. He thinks there is nothing to do but mix the lead, antimony and tin, pour it out, add a little over the cost of raw material and make out the bill accordingly. What a difference he finds when he uses these metals, for once having tried these ready-made babbitts he always comes back for the tailor-made kind, that cost more per pound but less per machine, time, labor, repairs, etc.

We hear a lot about babbitt made from junk and old metals, but as a matter of fact there are very few metal workers who do not reclaim all they can get of this class of material. Old metal is as good as the virgin metal, and if free from zinc or aluminum is even better than the new, for it often carries more tin than could be put in under the original formula. You get a better mixture for the money than you would otherwise. The continual melting over of metals makes them better, hence there can be no true argument against the use of old metals. I would prefer them to new and hold no argument against their use.

Bearings to be filled should always be dry and free from oil. When it is possible, they should be poured sideways, allowing the metal to come up against the mandrels slowly. This allows all the air which accumulates in the space to be filled to be driven out, thus insuring a perfect casting. Bearings poured on end show more shrinkage, as the fall of the metal is so great, often causing blow holes in the castings, and spoiling the results of your labor. Clay mixed with oil, making a putty-like mass, is the best agent to use to stop up the ends with, as it will not cause the metal to spit or fly when it comes in contact with it.

The lack of method of applying metal in the average machine shop is very faulty. In my observation among many of the shops, the larger being the most careless, there is an utter lack of system in the application of pouring and melting babbitt metal, and in the saving methods that could be used if given more personal attention.

In most cases boys are employed, also inadequate methods of melting are used. The old forge and heavy ladles are still used. Loose metals of all brands are lying around, making it possible for too many mistakes in mixing various metals together, thus spoiling them completely.

*Foreman of large metal shop in San Francisco, Cal.

A competent man in charge of the pouring and melting of babbitt metal would save the amount of wages paid him, by watching all wastes, such as melting more metal than needed, pouring excess metal into parts to be filled, and the saving of dross, which most shops now do not try to save. It either goes to the dump pile or is trodden into the floor with the rest of the dirt. Dross is nothing but pure metal, forming its present state by coming in contact with the air, and with proper furnaces is readily recovered.

Another important fact in bearing metal economy is the selection of the proper metal with regard to the service required. As in most cases the choice is left to the purchasing agent, who is governed solely by price rather than quality. The superintendent should always be consulted and his opinion secured first, as to the metal best suited for the job.

There is no need of the 57 varieties of babbitt metal that each manufacturer now puts on the market. It will be demonstrated some day, when the manufacturer understands more about this important phase of machine construction, that five grades will suffice any service. The five grades are namely: An all tin base babbitt, for high speed and parts that are subjected to heavy loads and shocks; second, a 50 per cent. tin metal, copper hardened, for all engines and machines of smaller capacity, which still would be classed as high speed; third, an anti-friction metal for pumps and like machines, that move more slowly than the above mentioned; fourth, a metal of about a No. 1 or 2 grade for hangers and small machinery parts of all classes; fifth, an ordinary babbitt of just lead and 15 per cent. antimony, for slow moving parts for filler metal, etc.

In closing I would like to add that the quality of the bearing metal in a machine lengthens its life, and in view of this fact it is surprising that knowledge in regard to bearing metal is not more general. Very few shops have means of testing out metals. They have to rely on faith, hence the rapid rise of firms who have established a reputation for their goods. They are always able to obtain a better price for their product.

COLOR OF CRUCIBLES

An Authoritative Explanation of a Much Discussed Problem.

By Jonathan Bartley.*

To the uninitiated the above subject may appear very commonplace, but with the crucible manufacturer, as well as the crucible user, it has been a "bone of contention" ever since graphite crucibles were made. Opinions are so radically different that it has become one of the most perplexing problems for the manufacturers to handle. Every mail that brings in orders will carry specifications diametrically opposite. An order from one user will call for "Dark pots" and the next one we pick up will demand "White pots." This misunderstanding (we call it such) brings no end of trouble to the crucible manufacturer.

It forces him to carry a double amount of stock to meet a whim that, with reason, has no foundation. In order to clear this long fought question, we will at this time go on record with the following statement, trusting our experience may be of some value in the future.

The only difference between a "dark" or "white" crucible is due to the fact that one has been subjected to a more oxidizing condition in the manufacturer's kiln. The object of the crucible-makers burning is to calcine the clay, which simply means to drive out the free and combined moisture. This is accomplished at a temperature of about 1800 deg. F. Carbon (which in this case means the graphite) will not accept oxygen at a temperature below 1050 deg. F. but beyond this point it will pass off in carbonic acid gas, leaving a silica film on the surface of the crucible. Therefore, to burn a crucible "White" means that it must be supplied with oxygen at a temperature above 1050 deg. F.

Should a crucible be burned within a sealed seggar so that no air could be introduced, it would come out just as dark as it entered, even though a temperature of 3000 deg. or over had been applied. It will be seen from this that as far as the purpose of the burning is concerned and a calcination has been obtained, the only difference lies in the effect of the natural elements. Many crucible users are under the impression that a white crucible has been burned at a higher temperature, driving out more completely the combined moisture, this making it less susceptible to a scalp. This is erroneous as we have already explained, and our experience is that a white pot is just as liable to scalp as one properly burned dark.

In order to satisfy ourselves we have made an extended experiment in our laboratory. Two crucibles, same size, same formula, were taken from our kiln. One was burned inside a seggar and the other placed at the very top of our muffled kiln, exposed to an oxidizing condition, both receiving the same degree of heat as indicated by the pyrometer. After standing three weeks side by side on our floor, the dark pot contained 1.46 per cent. moisture, while the white pot contained 1.56 per cent. The two were then taken and placed on top of our wet mixture in the "batch room" surrounded by a wet cloth to prevent moisture evaporation. After twenty-four hours it was found that the dark pot contained 5.13 per cent. moisture, while the white one had absorbed 6.59 per cent.

Third test was that of placing both crucibles over a trough of flowing water so that no water could come in direct contact, but close enough to get the benefit of the moisture ladened atmosphere. Result after four hours, dark pot, 8.62 per cent.; white pot, 11.09 per cent. moisture. It is apparent from this that a "white" crucible is more susceptible to moisture than a "dark" one, but we do not want a misinterpretation, therefore will define our contention in this broad manner:

If a crucible has passed the manufacturer's kiln at a temperature sufficient to calcine the clay and the oxidation has not penetrated beyond a depth of say 1/16 of an inch, there is no difference whatever in the quality between a "dark" or "white" crucible. We realize that our position will be combated by foundrymen who will take hold of both ends of the string, and while one can point to pointed incidents in his experience defending the advantages of the dark pot over the white, the other can get up and talk as freely on the other side. Our leaning, if it favored one or the other, would be in favor of the dark pot, provided it had been sufficiently burned, if for no other reason than to avoid answering the question as to why put two or three pounds of expensive graphite in a crucible and burn it out again.

It is argued by some that a white pot will glaze more readily, due to its siliceous surface, and under high temperature this theory is probably correct. But as a rule the ordinary brass founder does not require a heat sufficient to fuse, and in a crucible for melting steel, where the heat is beyond the fusing point, it is a noticeable fact that this protecting glaze after first pour, peels off more readily on a white pot than one burned dark blue.

*President Bay State Crucible Company, Taunton, Mass.

UNINTELLIGENT COMPETITION

THE FACTOR THAT ROBS BRASS MANUFACTURERS OF THEIR LEGITIMATE PROFIT.

BY S. JACOBSEN.*

The general belief is that combinations and consolidations of manufacturers is to stamp out competition and advance prices. Promoters have been one of the large influences in creating this condition, yet a greater one has been the ignorant unequal dishonest competition in business, which has brought many industries to such a condition that their owners are willing to listen to the plans of a promoter, or any schemes which give promise of even partial relief.

The first thing done by a consolidation is to revise its price lists. Then a great cry goes up about trusts, etc., as though it were a crime to be unwilling to sell goods at a loss or without profit. Low prices are usually made by ignorant manufacturers who conduct their business by rule of thumb—men who have not the capacity to appreciate system, to say nothing of originating it. Manufacturers of plumbers' brass goods are expected to sell their products in competition with any ignoramus, and meet any cutthroat competition when forced on them, and often made in such manner that they are powerless to prevent it.

The ignoramus figures in this manner—that if Paul and Jones quote an article at $1, they can make it for less, and so quote 90 cents. There is an absolute lack of system in everything they do except their system of price cutting. The question is often asked—why do not firms, which conduct their business on this basis, fail? They do. This country is strewn with wrecks of such firms, who fail time and again, compromise with creditors and then continue their unequal and ignorant competition.

Competition is industrial war; ignorant, unrestricted competition means death to some and injury to all; even the victor does not soon recover. We need the stimulus of competition to do our best. To it we owe our development. It is the fuel that feeds the fire of ambition, and up to a certain point it is a good thing, but like any other good thing it can be abused. To stamp out competition would mean stagnation and death. If there were no prizes to be obtained, men would cease to put forth their best efforts, which constitutes progress and growth. A successful manufacturing concern is not produced by chance, but by intelligence persistently applied. Its profits are made as much by orders rejected as by orders accepted, as they know where profit ends and loss begins, and when it comes to paying a customer to do his business they let the other manufacturers have that privilege.

The competition hardest to meet is not from the successful firm, but from the firm whose creed is—"So on I go, not knowing," "Tis blessed not to know." These are the firms who fail and whose competition often causes others to fail. The real cause for failures is largely the result of ignorance of the cost of production and doing business. Statistics are often quoted, which show that only a very small percentage of the men who embark in business on their own account succeed.

The reason for this enormous commercial death rate, in my opinion, is bad accounting, and in consequence, ignorance of cost of production, and by doing business, many men accounted shrewd have knowledge of accounts themselves and utterly fail to appreciate the real purpose of bookkeeping and accounting, and act on the assumption that any boy or girl just out of school who can be hired at the smallest salary, and wholly lacking in business training, is competent to do their bookkeeping.

But the investment made in employing a competent accountant will yield large returns, as they give the management facts, not guesses, in the matter of production costs. In years to come success will be won only by men who have exact and definite knowledge of costs. It would be well for the manufacturers endeavoring to reduce cost, to remember that there are two mighty forces at work all the time to reduce the price just a little faster than the manufacturers can reduce the cost. These are the buyers and the salesmen, and the manufacturer who is ignorant of his cost is usually ignorant of conditions in other things connected with his business, and is at the mercy of his own salesman and the unscrupulous buyers.

While it is admitted that the salesman's burden is not an easy one to bear, as he hears from morning to night one story from the buyer. "He is not in it, not even a little bit; your prices are too high. We have quotations much more favorable. So & So have agreed to allow all freight charges. Another will give from 90 to 120 days, but we will give you preference if you do as well as others because you are one of my friends, etc." Such statements may be true and may not. And if you could know the truth such prices have never been quoted, and no special terms existed up to that time except in the fertile brain of the buyer. These statements are simply made up to be granted by competing manufacturers.

The traveling man will say to his house that he cannot get the business and retain his trade unless the concessions asked are granted. The manufacturer being ignorant of his costs and does not know where the profit ends and loss begins, grants the concession asked for. Let us set about as intelligent manufacturers of brass goods to get our costs in order to get a price for our goods which will leave a reasonable profit on the goods we manufacture, and not let the buyer or our salesman set the price at which we are to market our goods.

The discussion of cost and employment of expert accountants and cost finders by each separate brass manufacturer, as suggested at the last New York meeting of the National Association of Brass Manufacturers, will be the greatest step made by the brass manufacturers for many years, and one which should have the hearty support of all. While the cost will be considerable to start, it will eventually be a very profitable investment, and will put all the manufacturers on a sound and profitable basis.

*Vice-President and General Manager, Burlington Brass Works, Burlington, Wis.

LEAD PRODUCT IN 1912.

The final figures of the production of lead in the United States in 1912 have just been compiled from reports of the output of each smelter and refinery in operation. The total production of refined lead was 480,895 short tons, a decrease from 1911 of 6,085 short tons, or 1.2 per cent. The value of the whole quantity was $43,280,460, of which $35,280,460 worth was from domestic mines.

CURLING, WIRING AND SEAMING DIES

THE SEVENTH OF A SERIES OF ARTICLES ON THE MANUFACTURE OF DIES. CONTINUED FROM APRIL.

BY EASY WAY.

CURLING DIES.

Curling or forming dies are used to form loops such as the curl of a box hinge or similar work. The blanks are always punched out the same as the flats shown in Fig. 1, and then forced into the curling die with a punch, of which plans are shown in Fig. 2. One has a flat V in the punch while the other has a sharp V to control the blank while entering the curl in the die; they are both permissible but oftentimes the materials used govern these conditions. In making these dies the hole is drilled and reamed, then the slot is milled and finished, after which the die is hardened and the hole lapped perfectly smooth with a round lap. Should a long hinge die be wanted with a small curl, the die can be made in any suitable and convenient sectional lengths and inserted in a cast-iron holder to suit any length required. Curling dies are also used to do work that in olden times was accomplished by spinning. But due to the great demand for articles constructed from sheet metal this plan of spinning the work was found to be too slow to supply the required wants and dies were designed to supplant this old method and have completely superseded the old way. These dies are of three different types, curling,

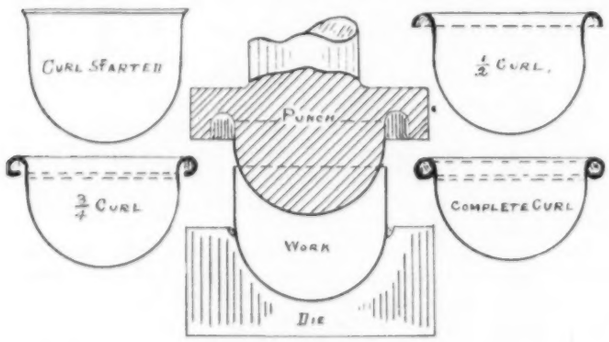


FIG. 1. SHOWING VARIOUS OPERATIONS OF CURLING.

wiring and seaming. Curling dies produce a curled edge on straight or formed articles, as a hinge for boxes or the top edge of a cup. Wiring dies are used to curl the metal around a wire that is straight or formed in a circle and stiffens the article at its edge. In this way very thin metal can be formed, then wired and the wiring will make it very rigid, as if produced from heavier stock. Curling and wiring dies are comparatively the same in construction, the only difference is that the curling die type produces a curl without the wire enclosed, while the wiring die produces the work more uniformly by the enclosed wire, as the metal can be wrapped snugly about the wire without collapsing.

Seaming dies perform the operation of joining two or more parts of an article together by upsetting their edges, they having been looped previous to the upsetting operation. This method is employed to fasten the edges together permanently as if they were soldered, as in tin can work. These connections are completed with one stroke of the press and the work is made uniform with a wonderful saving of time over the old methods. Seaming dies are generally of the horn type and are used on special built presses or machines made purposely for this work, together with automatic fixtures for double horning or seaming. By means of these machines the two corner seams on square shapes having round corners with the seam in the center may be closed with one blow. But the ones with square corners require a coaxing operation on a single horn press to start the seam over before setting permanently, as tin is a very unruly metal to form.

This class of equipment and machines are used very extensively for producing all classes of tin and enameled ware and perform their functions rapidly on articles or

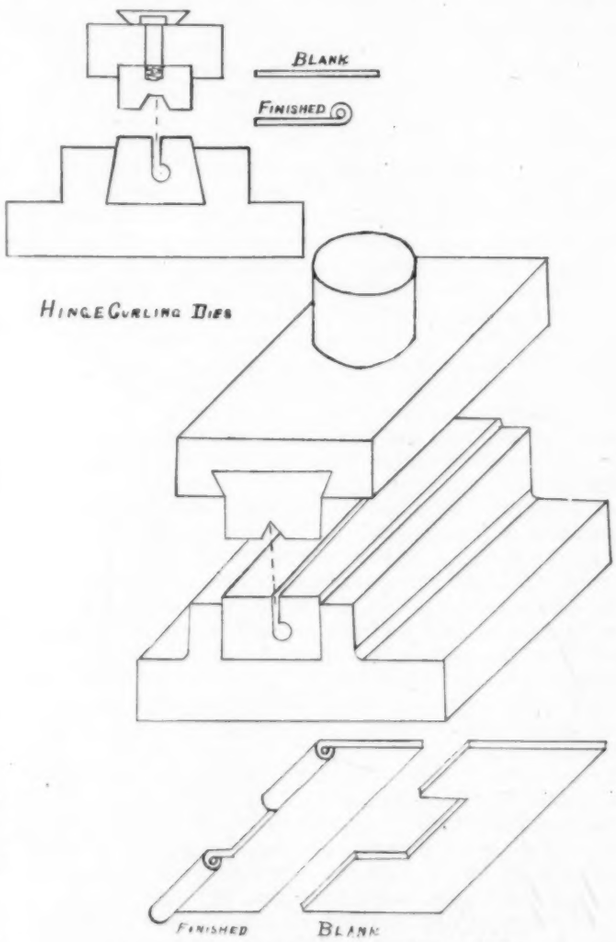


FIG. 2. PLAN VIEW OF CURLING DIES.

vessels as tea kettles, coffee pots, pails and similar goods. Also articles that have flaring sides, as in the case of shapes like pails, dish pans and other vessels which are smaller at the bottom than at the top. The double seaming on these shapes is accomplished against a solid plate of the size of the article's bottom diameter. For the straight-sided articles collapsible chucks are used. These chucks are made so that they spread and fill along the edge of the bottom, and when the article is carried up against the upper chuck, and is folded together, then after the operation is performed, this will permit the rapid and easy removal of the work. Another style is a horn movable in ways and has two working surfaces.

The upper one is acted on by a force bolted to the press slide; then while the lower one in descending with the slide acts against a stationary "force" fastened to the bed, and when the loosely hooked article to be seamed is pushed over the sliding horn, it is registered by a gauge and accurate sizes and positions are maintained.

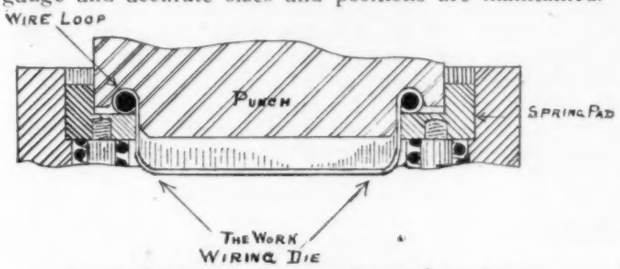


FIG. 3. THE WIRING DIE.

There are also double seaming dies and machines constructed to handle articles of irregular shapes, such as seaming ovals, oblongs and square shapes. With this type of equipment the seaming rolls automatically follow the shape and are used extensively on filled cans and do the seaming at the top of the vessel to seal its contents. These machines will handle several sizes and shapes as they are adjustable up and down for height, but require different chucks for the required shape of the article. There are also methods of rolling seams on square articles. This is accomplished by the vessel being held between two discs made to fit the heads of the vessel, and called the upper and lower disc. The upper disc is stationed on a vertical spindle that is fastened rigidly, and the lower disc to a shaft that is prevented from turning by an arm running in guides. Both of these are capable of a vertical motion imparted by a cam. Then the steel rolls which operate on the seams at the top and bottom are carried by a frame which rotates upon the upper and lower stationary shafts and around the vessel. This rotating frame carries two sets of rollers which press on opposite sides of a cam at both the top and bottom. By thus equalizing the side pressure the seams are rolled more perfectly than would be possible by the use of a single set of rolls, each seam being rolled twice in each revolution. Large producers have turned out seamed articles by this class of equipment at the rate of one thousand units per hour, and saved eighteen dollars per day in solder cost on their output.

CARBORUNDUM AND ALUNDUM

A COMPARISON OF THESE ABRASIVES WITH EMERY.

BY S. A. COCHELL.

It is with a great deal of interest that I have read from time to time in THE METAL INDUSTRY articles pertaining to the uses and abuses of polishing wheels, the proper care of same and the different makes. In all of the articles that I have read, I have yet to see one that has mentioned the two, or probably three, most essential things that it is necessary to know, namely, proper speed that the wheels should run, the glue or adhesive, its proper care and use, and last, but by no means least, the abrasive and the proper way to apply it—whether it be emery, carborundum, alundum, corundum or adunits.

It is a well-known fact that at some time every up-to-date polishing shop has tried them all and most generally has fallen back upon the use of emery. While we are, at present, using emery, I have been experimenting to try and find some adhesive that will hold either carborundum or alundum on the ordinary polishing wheel. Anyone that has ever used carborundum or alundum grinding wheels will admit that they are far superior to an emery wheel, both as a fast cutter and as to lasting quality, and it is a well-known fact that many shops have discontinued the use of emery wheels after trying either one or the other. We are using at present carborundum and alundum grinding wheels both on hand and automatic machine work, and they are put to the severest tests on the automatic machines, grinding off malleable stove tops.

I have found that a carborundum or an alundum grinding wheel does more work, quicker and better, and will last four times as long as any emery wheel that I have ever used. The work that these wheels will do is enough to make any man, whether he be a polisher, superintendent or manager, sit up and take notice, and wonder why these carborundum and alundum grains cannot be used on an ordinary polishing wheel, the same as emery. The reason that these materials cannot be held on the wheel the same as emery is that both carborundum and alundum are a great deal harder and tougher than emery, emery grains being more brittle and less apt to break away from the wheel, although small particles do break away and leave an irregular cutting surface. On the other hand, carborundum and alundum, being so much harder and tougher, make a very sharp cut at first, but soon start to smear the work, and it will be found that the cutting surface has left the wheel and is down to the glue. In other words, the adhesive is not strong enough to hold it and the entire grains break away from the wheel.

I have tried it on all kinds of wheels and on all classes of work and have found that a medium soft, universal polishing wheel is the best for its use, set up with a good grade of emery glue, strong enough and flexible enough to withstand the temperature, whether it be at seventy degrees or ninety degrees, setting the wheel up the same as a wheel is set up in emery. Care should be taken not to press the work too hard upon the wheel, for, on account of its sharpness, it will be found that it cuts at least twice as fast as emery, and it is not necessary to work on the wheel as hard as if it had been set up in emery.

Notwithstanding the above and although I have had more or less success in holding these grains, I have not, as yet, been able to use them so as to make them as economical as emery. I heard of a stove shop down East that was using carborundum and sent to them requesting them to send to us a few pieces of their castings and also one of their wheels set up in carborundum. They did so, and I found that the wheel they sent only did about one-half the amount of work we could do on one of our own wheels set up in the same grain. They were using a softer metal in their castings, and that was the reason they were able to make use of the carborundum grain. We returned the compliment by sending their wheel back and also sent one of ours set up in the same grain and by the same method that I have above stated. Since that time we have received a letter from them, asking where the wheels could be bought, as their men found that the universal wheel I sent was far superior to the wheels they were using, and would hold these grains far better than their wheel.

I also sent two wheels to one of the companies that manufacture these grains to see if they have a method

of setting up the ordinary polishing wheels so they will hold the grain. They set the two wheels up and sent them back, but we found that the method they used to set the wheels up has made them so hard that it was impossible to use them. I have been in the polishing business for thirty years and for the last eight years have had charge of one of the largest polishing shops in the country. I have come in contact with a great many men from different metal working institutions, and from inquiries that I have made of them I have found that very few of them ever tried to use either of these grains, and the ones that have tried to use them, with but one or two exceptions, claim that they have had very poor success. I would like to hear, through THE METAL INDUSTRY, from someone that has tried either carborundum or alundum and was able to use it successfully, so as to make it as economical as emery. At some other time, with the permission of the editor, I would like to state, in a small article, from a practical standpoint, about glue—its use and abuse—also the speed at which wheels should run, as I think that such information would prove very interesting.

THE ELECTRO-DEPOSITION OF GOLD*

AN ADDRESS IN WHICH IS GIVEN PRACTICAL DIRECTIONS FOR THE GILDING OF METAL ARTICLES WITH GOLD.

BY A. JEFFERSON.

In putting before you the subject of my remarks I recognize that I am addressing myself to a very practised audience, some of whom have had as many years experience in manipulating the powers of electricity through the medium of silver and gold plating solutions as I have had years of existence, and on that account I want to try and put the subject before you in a very practical way so as to appeal to the centuries of experience which this meeting collectively represents. I should also like to say a word of appreciation to those who may not be so vitally interested in the subject under consideration, but because of their interest in the well-being of our society have honored us by their presence. It may not be impossible that something may be gleaned by and from these gentlemen to our mutual advantage.

In introducing the subject of the Electro-Deposition of Gold, I want to say at the outset that I do not purpose setting down any dogmatic formula which must be followed with scrupulous exactitude if perfect results are to be obtained; rather do I desire to set before you the two most widely used methods of preparing the gilding solution in workshop practice, and to suggest possible reasons for certain undesirable results which are a source of annoyance to the operator and equally so to the managers of finished departments and the burnishers.

The art of electro-gilding, for that it is an art separate and distinct entirely from electro-plating, will not, I think, be disputed, is of the first importance, and demands an intelligent manipulation and a keen eye. The results produced depend upon fundamental qualifying conditions which we cannot afford to ignore, such as cleanliness, current density, E. M. F. metal content, free cyanide, temperature, etc. I know a gentleman who learned to play the piano very well indeed, but he aspired to making music his profession, and put himself under a highly qualified musician. Although he had mastered the keyboard and could bring forth sweet music, his first business was to unlearn a great deal he had prided himself on and start again with scale practice.

Perhaps if you will allow me it might serve a useful purpose if I traversed the well-known path of knowledge and started with you at the very beginning of things by indicating the lines on which the two most familiar methods of preparing or making a gold solution are conducted, and branch off from that point into the more or less illuminated side tracks where trouble lurks in waiting to disappoint us when we had looked and hoped for perfection. First, then, we will consider the method of preparing a solution by precipitating the gold chloride and converting the fulminate or cyanide of gold, as the case may be, into the double cyanide of gold solution, and second, that of dissolving into a solution of potassium cyanide a sufficient quantity of sheet gold by the electrolytic process to make up the gilding bath. I will not weary you by exhaustive detail in what is to most of you a matter of everyday experience, but will content myself by simply describing the process of conversion, if that is the correct word to use. In making up a solution from gold chloride, either home made or purchased, the gold is precipitated by ammonia or cyanide—ammonia for preference because the resulting precipitate is more easily secured, and there is less likelihood of complications. In using potassium cyanide as the reagent there is a great difficulty in determining exactly the point at which it ceases to act as a reagent and commences as a solvent. The slightest excess added after the chloride is converted into single cyanide of gold will re-dissolve a percentage of the precipitate. This is not so easily possible in using ammonia as the reagent, for although fulminate of gold is slightly soluble in excess ammonia, yet it is quite safe to add well over the amount required without fear of loss in metal. So I favor the ammonia. The precipitated fulminate, which, by the way, is very explosive if allowed to dry and then exposed to friction, is well washed and re-dissolved by just a sufficient amount of cyanide to allow of a bare percentage for free KCN, and the solution is ready for working. This process needs watchful care.

In the electrolytic process a start is first of all made by dissolving cyanide in water into which a sheet of gold is suspended as anode, and a strip of copper as cathode. The whole are then connected up and left to work out their own salvation and sometimes that of the gilder's also. I have no doubt that many gentlemen present have, like myself, made up solution from both of these methods which have given very gratifying results, so much so as to have commended the perpetuation of the one or the other. But here let me state a principle which applies with equal force to the gold plating solution as to the silver plating solution; it is that the freer a solution can be kept from elements other than the metal we wish to deposit the better. Bearing that principle in mind, it must follow that a gold solution, into which nothing has been introduced but the necessary metal and the necessary converting agent in perfect combination with each other, will, or should, give up its metal in a purer form than a solution into which baser metals have been introduced either during the process of preparation or in the subsequent manipulation; and also if this solution fails to give satisfactory results there is less complication to consider in finding out the cause in a purer solution than in a more complicated one.

Now in a solution made from the chloride there is and can only be the pure gold to convert into the double cyanide of gold solution, which, if the best quality cyanide be employed and ordinary care exercised, can only contain the three ingredients used, which are water, cyanide and

*From a paper read at March meeting of Sheffield Society of Applied Metallurgy.

gold, each in known quantities, which enables the operator to sustain a consistent metal content with less likelihood of trouble from an excess of cyanide. If, on the other hand, the solution is made by the electrolytic process there is a commencement with a more or less known quantity of cyanide dissolved into a more or less known quantity of volume of water, and there has been a fourth ingredient introduced by the copper cathode, which on account of electrolytic action in the presence of hot potassium cyanide is bound to combine in solution in more or less quantity to the detriment of such solution. This is almost certain, even though the cathode be suspended in the confines of a porous cell. There is, however, a great deal to be said in favor of a solution made in this way; it is simple, quick, and requires little attention during the process, and will yield good results for a period. My experience has been that it works better cold than hot, but the impurity introduced, although not immediately perceptible, is sure to show its presence later on, and there is also the probability of excess cyanide to reckon with, which in hot solutions particularly is a very undesirable and harmful element, apart altogether from the waste point of view.

So much, then, for the two methods of preparation. I think I am right in saying that a very large majority of those who have to do with gilding prefer a warm solution rather than a cold one, and undoubtedly a richer, warmer tone is obtained from a solution of moderate temperature than we get from what is called a cold solution. Warming a solution also decreases the resistance and increases the current, so that the changes in color may be due not only to the changes in temperature, but also to the current as affected by the temperature. Consistent current density and a fairly high E. M. F. play an important part in electro-gilding, and when we have arrived at the correct density suitable for the particular work we are chiefly engaged in it is advisable to arrange for its perpetuation. Gold is an electro-negative metal, and can be deposited by simple immersion. It is quite possible to gild a piece of copper by simply immersing the metal in a fairly rich solution with a good percentage of free cyanide, which is proof of the electro-negative properties of the deposited metal. Now if we follow this result and apply it to ordinary works practice it may possibly shed a little light on that cloudiness which sometimes is disconcerting to the gilder. You get a beautifully burnished silver cup or bowl (and let us give credit to the burnisher when her work justifies it) and you gaze into the shining depths, then into your steaming solution, and no man or woman knows exactly what is passing in your thoughts except yourself, and I will not venture a guess; but the operation must be gone through. So in goes the solution, after, of course, due precautions have been taken to see that the article is freed from soap. If the gilding is perfect there is silent congratulation; if it is clouded a little, the anxious burnisher is assured that a gentle application with a soft leather will effect wonders. But the conscientious gilder is none the less troubled because the work is not satisfactory.

If there is any clouding, there must be a cause, and usually the cause lies in an excess of cyanide. Potassium cyanide is a solvent for the noble metals. In a roughened surface the capacity of absorption is more pronounced than in what may be termed a case hardened surface. This fact may be proved on almost every metal the plater is called upon to treat in everyday practice. The act of burnishing closes up the pores of the basis metal under the silver coating and offers a more or less impervious front of silver to the attack of free cyanide. What happens is this: During the very brief interval which elapses between filling with solution the article to be gilt and suspending the gold anode the cyanide, which, as I have just stated, is a solvent for silver, has attacked the silver front and dissolved off a film into the solution which process dulls the surface. Now, not only is this result very annoying at the time, but the silver dissolved from the cathode has entered into combination with your gilding solution, and if this occurs frequently the gilding bath is bound to be impaired, and you will ultimately get a very sickly kind of deposit. Probably to overcome this more gold will be dissolved into solution, which will predominate the bath for a time, but it has not removed the trouble.

Some gilders for various reasons resort to anodes of copper. This practice is to be deprecated if a perfect, consistent, characteristic gold deposit is required, for it is impossible to immerse a copper anode without dissolving a portion into solution. I think these deductions bring us up to the fact that it is safest to use a pure gold anode in a solution of small free cyanide content. There is a great deal of gilding done on burnished B. M., and owing to the meager deposit of silver on this class of goods, it is not always guaranteed that all portions of prominent inside work or round the bottom solderings of sugars and creams will be covered with silver when the gilding operation commences; and if a hot solution is used in which is too much free cyanide the fault will be aggravated by the same process as described in the silver bowl, only there will be a streak of black which will increase in intensity the longer the solution stands in the article without an anode completing the circuit, and which cannot be covered by any other means than by re-silvering; and I suggest that for this class of work it might be a convenient plan to use a cold solution, which permits of more free cyanide than a hot one. But I have no hesitation in saying that the rich, mellow color which all gilders covet is more likely to be obtained from a good, equally balanced, warm solution.

Reputable firms are not niggardly in responding to reasonable requests for purchases of gold, and the gilder should always consider his firm's reputation in the execution of his duties, and not allow the solution to deteriorate for the asking of supplies when he can with assurance state the necessity. The Birmingham operators are particularly clever in sustaining that good gold color on the insides of small silver work; and I should imagine that their gilding solutions are rather weak in metal content and renewed at regular short intervals. I have seen the phenomenon of a good yellow color produced on the inside of a B. M. sugar by filling with caustic potash solution and immersing a piece of common coarse flannel. I do not, however, pretend to a knowledge of the chemical action which takes place.

There is just one other thing I should like to mention before closing. It might prove of interest, and possibly some light may be thrown upon the matter by someone present. If for some reason or other a gilt article has to be soldered in some small place, it is peculiar that the gold appears to have been burned off, and when we look at the soldered article there is no gold to be seen where the heat has been applied. Now, as gold does not evaporate, nor does it melt under 2,000 per cent. Centigrade (a heat which is seldom if ever attained in soldering), where does the gold go to? (Applause.)

A discussion followed.

DISCUSSION.

Mr. A. Parsons said there was just one point with regard to gilding not mentioned by Mr. Jefferson. Nearly half a century ago he remembered that the only anode used in the firm where he was employed was platinum. He did not think that was used

today. And he could not say that any specially good results were obtained from it. Also, it certainly had this disadvantage: one was constantly having to supply the solution with gold, as there was no sheet to dissolve. He thought it was remarkable that all that time back the men who did the gilding obtained wonderfully good results, and the gold was consistent. There was very little variation.

Mr. Frank Mason (joint Hon. Secretary of the Society) alluded to the making of the electro-gilding solution by the electrolytic method. Mr. Jefferson had pointed out that usually a copper cathode was used, and the detriment to that was that copper was to some extent dissolved in the cyanide of the solution, thereby causing a somewhat red deposit of gold. Mr. Mason suggested that in place of the copper cathode either an iron or a carbon cathode could be used, and little or no detriment would result, at all events so far as the color was concerned. In connection with this clouding of bright gilding, some years ago he watched a gentleman from Birmingham who to his mind was an expert in gilding. This trouble had occurred many times, and this gentleman got over it by a very remarkable plan, and that was by suspending the anode of gold in the article before pouring in the solution itself.

Mr. G. B. Brook (joint Hon. Secretary of the Society) alluded to the question of the apparent burning off of the gold at the place where a gilt article had been soldered (as had been mentioned by Mr. Jefferson at the close of his paper), and he pointed out that the gold was absorbed in the metal underneath, this action being produced by the heat which was applied where the soldering took place.

Mr. W. R. Barclay also commented on this question of the absorption of the gold. He said the absorption only happened when the deposit was of the nature of a thin film, which they associated with bright gilt. When they got to a decent deposit of a dead gold nature they very often could heat the article considerably above the temperature of the hard solder, and they got no apparent absorption of gold. There were, he continued, two cyanide compounds of gold known, and he did not think this knowledge was shared by electro-gilders particularly. The ordinary compound of gold which they got when they made up the solution by either of the three methods which Mr. Jefferson had mentioned gave them potassium auro cyanide, which was supposed to have this formula: AuCN,KCN. Another potassium cyanide compound of gold was known besides that one. It was known to chemists as potassium auri cyanide, and its formula, which was rather a peculiar one, was: $Au(CN)_3KCN+3H_2O$. This compound was not usually made, and once when he tried to make it it rather shook his nerves, because he was afraid of some explosion.

He was absolutely convinced that some very fine deposits of gold could be obtained from this compound. When it was made properly it resulted in very fine, clear crystals very much of the nature of silver nitrate, and it was an extremely interesting point to him as to whether it could not be determined which of these two compounds was really the better solution for gilding, and what exactly was the difference in the electro chemical action which resulted from a current passing through one as compared with the other. He would ask them to think the problem over. To his knowledge no one had yet made any experiments whatever on this substance; and he could leave the matter safely by just saying that if anybody got hold of it and could use it with care and sufficient self-confidence to go in for experimenting, they would find that it gave them a very fine deposit of gold indeed. (Applause.)

Mr. A. Price did not think that Birmingham gilders were any better than they were in Sheffield. He thought the bright gilding which they got in Birmingham articles, such as cigar cases and cigarette cases, etc., was attributable to the use of copper as a base on which to put the gold, so that there was a reflection from the copper.

Mr. A. Jefferson, replying to the discussion, said he had not referred to platinum because he thought the present price of platinum would forbid its use. He believed it now cost about 210/- per ounce, which was very much in excess of the price of gold. That reason alone would prohibit its use as an anode. Then there was another objection to the method of fifty years ago, and it was this: that after one had dissolved all the gold in the solution it became very weak, and invariably the plater was faced with a sudden disappearance entirely of gold from the solution. The present method of using the gold anode was far preferable to any other anode which could be introduced; but even should a platinum anode be used one had not overcome the difficulty of the free cyanide content, which was a very important factor in a gilding solution. They could not gauge the amount of free cyanide in an electrolytically made solution. Then Mr. Brook's explanation of the apparent disappearance of gold would be very gratifying to those who had to buy the metal and wondered where it had gone to. They would have at least the satisfaction of knowing that it was on the article. Mr. Barclay had introduced new ideas into their thoughts which he (the speaker) hoped they would think about very deeply. Alluding to other points raised in the discussion, Mr. Jefferson said the fundamental objection to the electrolytic process was that they could not gauge the amount of free cyanide, whereas they could do so in the fulminate or cyanide of gold solution.

THE ROSE GOLD SOLUTION.

By Charles H. Proctor.

The rose gold finish, sometimes also termed "old gold," had its origin from a foxy gold solution that plated a muddy color and yet, when relieved on the high lights with a little pumice stone, produced the effect mentioned combining an orange yellow with the rose effect. There are many solutions used for this purpose, probably one of the best is made from one-quarter ounce of pure 24-karat gold, dissolved in aqua regia in the usual manner, then precipitated as fulminate with ammonia (26 degs.), and then well washed. Add the gold salt to a solution of one gallon of cyanide solution, standing 2 to 3 degs. Baumé and add one-half ounce of hyposulphite of sodium to each gallon of solution so prepared. This solution will produce a good flash gold with a weak current. Cheap rose gold work is first acid copper plated for a few minutes, then relieved on the high lights and then gilded. Gold work is run for five to ten minutes with a strong current, according to the tone required, then relieved with sodium bicarbonate instead of pumice stone.

To produce a rose gold finish without the use of gold a number of concerns are using the Electrochroma Process,* in which the articles are immersed in a special bath in the same manner as employed in plating. In a minute or two the articles are coated with a pinkish yellow surface that resembles rose gold. The surface is afterwards relieved to produce a contrast effect on the high lights.

This finish can also be imitated very successfully by the following method: All articles, except those of brass, should be previously brass plated and then a surface similar to the brush brass finish produced. Use floated silex instead of pumice stone so that the surface will be even and not have a scratchy appearance. Then gold lacquer, using a yellowish instead of a red toned lacquer. The surface should be thoroughly dried on the lacquer heater. The rose tone is then produced by mixing dry orange chrome and a very little finely powdered gold rouge, mixed with turpentine and a teaspoonful of turpentine varnish per pint of the mixture. This should be mixed to a thinly fluid paint and then applied to the detail work with a soft brush. The articles should then be dried for a short time by the aid of heat and allowed to become cool. The surface should be opaque without any lustre when dry. Now mix up equal parts of boiled linseed oil and turpentine and use this for reducing the color from the surface. To accomplish this operation, moisten soft rags with the mixture and remove the colors from the high lights or detail work. After this is done the articles will have the appearance of true rose gold.

*The Metal Industry, November and December, 1911.

THE MICROSTRUCTURE OF GERMAN SILVER *

SOME INTERESTING DATA RELATING TO TEMPERATURE EFFECTS ON THIS IMPORTANT ALLOY.

BY O. F. HUDSON, M.Sc., A.R.C.Sc. (BIRMINGHAM UNIVERSITY).

(Concluded from May.)

EFFECTS OF ANNEALING.

The structures of the cast alloy and the final cold-rolled strip are illustrated in Figs. 7 and 8. Portions of the cold-rolled strip were then annealed for varying times at a temperature of 720° C., and typical structures of annealed specimens are shown in Figs. 9 and 10. Here again the persistence of the "cored" structure is evident. Fig. 9 shows that annealing at 720° C. for 6 hours was quite insufficient to give uniformity of composition, but after 15 hours at this temperature (Fig. 10) the alloy was perfectly homogeneous. The question of whether or not a German silver is composed of a perfectly homogeneous solid solution can be decided by the examination of a suitably polished and etched surface by means of a hand lens, or even by the naked eye; for the presence of any remains of "cores" is shown by a very fine but distinct pattern or graining which is accentuated by relief polishing, owing no doubt to slight differences in hardness.

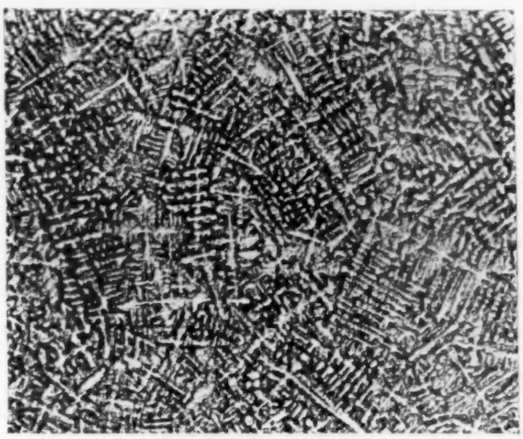


FIG. 7. CAST GERMAN SILVER × 100 DIAMETERS.

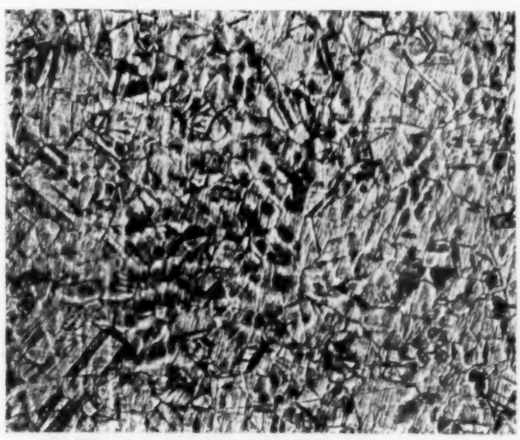


FIG. 9. ANNEALED FOR 6 HOURS AT 720° C. × 100 DIAMETERS.

The extreme slowness of diffusion in German silver as compared with the corresponding *a* solid solution of the copper-zinc alloys is probably due to the presence of nickel. Diffusion appears to take place equally slowly in cupro-nickel, as is shown in a series of photomicrographs of the structure of that alloy which were published by Bengough in his recent paper on the properties of alloys at high temperatures.* An examination of those photographs indicates that annealing for an hour at a temperature of 800° C. was insufficient, and that the same time at 900° C. was required to make the alloy homogeneous.

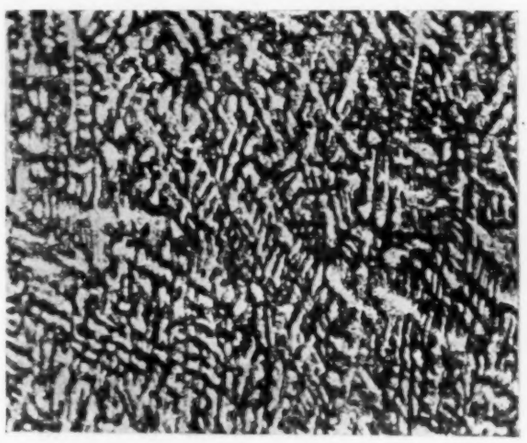


FIG. 8. COLD ROLLED × 100 DIAMETERS AND REDUCED.

It may be of interest very briefly to note here the results of a few preliminary experiments made to determine the effect of heat treatment on the properties of German silver.

ROLLING QUALITIES.

Annealing for 10 minutes, 100 minutes, and 10 hours at 800°, 850°, and 900° C. in all cases gave specimens that were found to roll easily and well, and the same result was obtained after annealing for half an hour at 950° C. and 1000° C. All these annealings were carried out in air in an electrically-heated tube furnace, while a specimen annealed for 2 hours in an atmosphere of coal-gas at 850° C. also rolled perfectly. A portion of the specimen whose structure is shown in Fig. 10 was also rolled with satisfactory results, and on again annealing

FIG. 10. ANNEALED FOR 15 HOURS AT 720° C. × 100 DIAMETERS.

*Paper read at March meeting, Institute of Metals, London, England.
†"Alloys and Their Industrial Applications," by E. F. Law (Griffin).

*"Journal of the Institute of Metals," 1912, No. 1, pp. 123-174, Plate XV, Figs. 2 to 6.

for a short time at 750° C. the structure of the alloy was, as shown in Fig. 12, one that indicates no deterioration in mechanical properties. It thus appears that a coarse crystalline structure due to prolonged or drastic annealing is in itself no sign of inferior rolling qualities.

HARDNESS.

The original series of specimens supplied by Mr. Boeddicker were tested by means of the Shore scleroscope, and the results, of which a selection is given, show that prolonged annealing accompanied by pronounced crystal growth does not lead to any decrease in hardness beyond that due to the normal annealing operation.

	Hardness Number.*
As rolled	60
Annealed for 1 hour at 700° C.	23
3 " "	23
10 " "	26
48 " "	23
72 " "	26

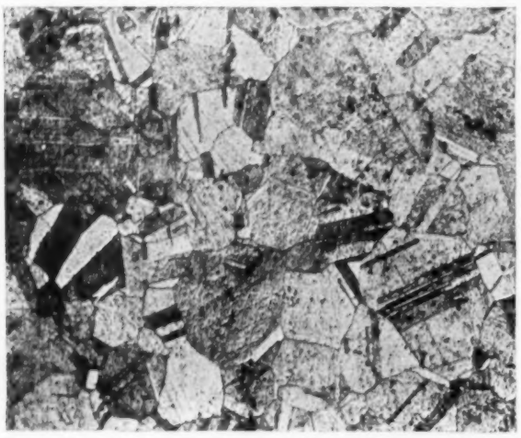


FIG. 11. SAME AS FIG. 10, BUT COLD ROLLED AFTER ANNEALING × 100 DIAMETERS.

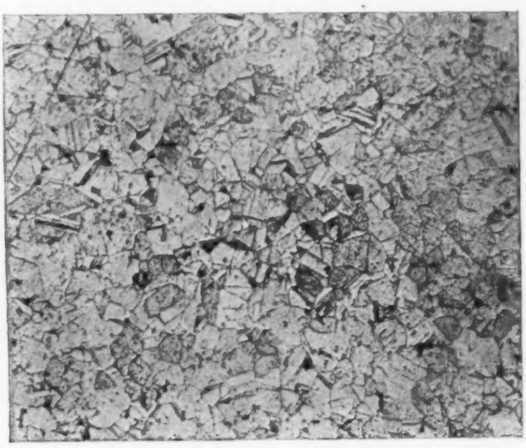


FIG. 12. SAME AS FIG. 11, AFTER ANNEALING FOR A FEW MINUTES AT 750° C. × 100 DIAMETERS.

In conclusion, the author wishes to thank Mr. G. A. Boeddicker for his kindness in providing the material on which this work has been carried out.

*The hardness number is that obtained with the "Blunt" hammer.

PREPARING GREY IRON FOR POLISHING AND PLATING

A PRACTICAL ANSWER TO AN ARTICLE ON THE SAME SUBJECT IN THE MARCH ISSUE OF THE METAL INDUSTRY.

BY T. C. EICHSTAEDT *

I have read the article relating to a practical method of pickling grey iron castings, written by Col. J. H. Hansjosten in the March number of THE METAL INDUSTRY. While the article may have been well written it is not a good and thorough description of the method, which the writer probably understood well himself. He did not go into detail enough to be of much help to one not well acquainted with the process, so I shall endeavor to improve on it and give here a more detailed description of the way to operate the pickling of gray iron castings. While this method is in use by most of the large stove manufacturers, still there are some who do not use it, because the plater is afraid of it as the pickle is the cause of much trouble to the plater when it is not properly done. I shall try to explain why this is so before giving the directions for pickling.

When the acid is not neutralized or taken out of the castings either before polishing or before plating the acid in the castings causes a reaction in the nickel solution and the work will not plate until the acid is thrown out of the castings. This, of course, causes the nickel bath to become very much saturated with acid and if the work is continually plated in the nickel bath in this condition it will not be long before the nickel bath is put out of business altogether. And again, another bad effect of plating such castings that have a background, is that after the casting is plated, buffed and cleaned it will always turn yellow in a few weeks' time. If it is a plain casting there will appear on the surface mottled spots like pock marks. This is on account of the casting being porous, which is the nature of all gray iron castings. These pores retain the acid and do not become covered with nickel or any other metal, brass, copper or bronze. We may have a little better result in first copper plating in a cyanide solution, still it will not remedy it or overcome spotting out altogether. This will be very noticeable on plain work, especially on work that is to be oxidized.

I do not wish to criticise Mr. Hansjosten too severely, but it seems to me from the experience that I have had with this method of pickling that he has not the actual experience of doing this himself or, at least, he does not seem to have the thorough knowledge of it. He has taken for granted that everybody reading the article was familiar with it and did not go into detail long enough for anyone to go ahead with the method without getting into a lot of trouble as a result of the pickle. I find this true of many other articles that are published on polishing, plating and cleaning of metals and while I do not profess to be a critic or perfect even in the articles that I write I always try to explain any dangers there may be in the process or method I am writing about.

The formula for the pickle that I have used extensively is as follows: A mixture of sulphuric acid and hydrofluoric acid. First, fill the vat or tank with water up to within 10 or 12 inches from the top, then put in enough sulphuric acid to bring it up to 6° Baumé. After adding enough sulphuric acid add enough of hydrofluoric acid to

*Expert plater and polisher, Piqua, Ohio.

bring it up to 10° Bé. While Mr. Hansjosten says there is no way of getting the exact strength of this pickle I beg to state that there is and that this pickle can be kept at 10° Bé. always by adding the acid in the following proportions:

Sulphuric acid	3 parts
Hydrofluoric acid	1 part

In other words about ⅓ as much hydrofluoric acid as sulphuric acid. The pickle can be tested every day and maintained at an even strength.

The tank must be of wood, as iron or earthen ware will be attacked by the acid and will not last long. Wood will not stand the action of the acid very long either, therefore the best thing is a wood tank lead lined and with false bottom and sides put in on top of the lead to protect the lead from being punctured. This tank should be just large enough to take in the work that is to be done in the pickle. It should also have a drain in the bottom and should be of either brass or lead as any other metal will not stand the action of the pickle. A wooden plug should be used, long enough to extend above the top of the solution in order that it can be pulled out without getting the hands into the solution when removing the plug.

This tank should be under a hood and a cold water tank of the same size alongside of it in order that the work can be rinsed in cold water to take off all the acid possible before going into the neutralizing solution. This cold water tank should also be of wood and lined with lead or asphaltum similar to a tank used for nickel plating. Both the water and pickle tanks should be coated with hot asphaltum or painted with three or four coats of asphalt paint on the outside before using, as this will prolong the life of the tanks indefinitely. The cold water tank should have an overflow and drain and the water should be running continuously while in use and drained every day, preferably in the evening.

Now I beg to differ in the neutralizing solution from any other method I have heretofore read of, but I have used it with success while others have failed to neutralize the acid in the castings. Instead of lime water I use a solution of "Banner Lye," standing about 6° Bé. and have it boiling continuously. This tank should be of iron and have a drain in the bottom and also an iron coil of steam pipe in it against the front side, not in the bottom or back, only in the front. This will cause the solution to boil back and wash through the castings that are suspended in the tank. There should also be another tank of iron for hot water and it should be the same size as a tank for lye. This tank should have a drain and overflow and the exhaust steam from the coil in the lye tank will keep the water hot enough to rinse the lye and dry the castings off. The four tanks to be used should be uniform in size and placed in or near the mill room. They should be either connected with an exhaust fan to the hood above or a chimney or some sort of draft that will carry the fumes away.

Another method and one which is sure to neutralize, is to have a lye tank connected with a 6-volt dynamo which has sufficient amperage for the articles required to be neutralized. Put the castings in connection with the current the same as an electric cleaner, with a double throw switch, and use the current two minutes one way and two minutes reverse. This will not only force all the acid out of the pores but will throw off any rust that may have accumulated on the castings from water dripping on them and will also remove every particle of acid.

In order that one wishing to do so may go ahead and install a pickling room, I will state that hydrofluoric acid is a much better pickle alone than the mixed solution. The claim is general that hydrofluoric acid only takes effect on the sand, but I know better than that as I installed a hydrofluoric pickle in a foundry and operated it for three years and plated the work in all kinds of finishes such as brass, satin finishes, oxidize and even gold clock frames, also nickel, and did not have any trouble with spotting out or rusting. All the work that had a background turned out clear in brass, copper and nickel plating, and I did not use any scratch brush on any of the castings. The hydrofluoric pickle should be run the same as the mixed, only that the solution should stand at 15° Bé. and be kept up to that point continually.

The operator on a straight hydrofluoric pickle should wear rubber gloves or a new pair of leather gloves each day. The rubber cost more but it is merely a question of how careful the operator is as to which is the cheaper. If the acid comes in contact with the hands and the fingernails it is bad for them. It also has an effect on the teeth and while it should be under a hood it would be a good thing for the operator to wear an inhaler also as a protection for the teeth. As to the sizes of the tanks, this is, of course, according to the kind of work you have to pickle. I will try to give what I consider a good size for ordinary gray iron castings and give the exact directions for handling same. If this is followed out you can make no mistake in adopting either one of the pickles.

When I put the hydrofluoric acid pickle in I reduced the polishing price 30 per cent., the material cost being reduced much more than that, to say nothing of the extra room I had for more polishers without putting in new equipment. Yes, sir; it pays to pickle gray iron castings if done properly, but if not, it costs much more than if one had not tried to do it. One may reduce the cost in polishing all right by pickling, but if the acid is not neutralized it will cost more in the plating department as it will spoil the solution, take an indefinite length of time to plate it and even after you have plated it it is ten to one that you will have it come back to be replated. So then the principal danger in the pickle is in not neutralizing the acid, which I overcome by using the "Banner Lye" solution and connecting a dynamo to it and a reverse current and you will never have any trouble with the pickled work in the plating room.

Four tanks of 48 by 48 by 48 inches will answer the purpose. They should be: two of wood lead lined and two of iron. An overhead rail for a trolley and hoist and three baskets or buckets (whatever name you wish to give them) of the following dimensions: 24 by 24 by 24 inches, and made of cast brass a quarter of an inch thick. These can be made in your foundry. Make the patterns of wood so that the bottom and sides fit into the ends and fasten with brass bolts. The buckets should be perforated with ¾-inch holes in the sides, ends and bottoms. They must be of brass as no other metal will withstand the action of the acid. I have used five of these baskets for three years and they were then still good for three more. Col. Hansjosten says "use wood and nails for buckets," but this will not do and he also says, "stack or hang the pieces back to back." This is not necessary; just put the work into the buckets as it comes from the mills and do not stack it, but put it in so that it is not packed. Put small and large pieces all together, only care should be taken not to put the work that has hollow places in it in such a position as to hold the solution. Large flat pieces should be put in the bucket on the edges, such as reflectors, base strips, oven doors, etc. One man can pickle enough work for thirty or forty polishers in this way. There is no fear of not having the small work pickle as well on the inside of the bucket as on the outside of it, as the acid will have action enough to take hold of it.

In regard to the sand blast I will state that if you are equipped with one it is about as economical to run the work through it after pickling as it is to scratch brush it. But the work should be either scratch brushed or sand blasted after pickling, excepting the small work which should be tumbled bright.

The castings should be pickled from fifteen to twenty minutes in the pickle. Never less than fifteen nor more than twenty. They should then be rinsed in cold water, then put directly into the hot lye tank for fifteen minutes unless you have the electric current connected with it. In this case you put the current on for two minutes and then reverse for two minutes as stated before. Then simply rinse in the hot water and take out. A couple of pieces of 2½ or 3 by ½ inch flat iron can be bent in such a way as to allow the bucket to set on them in the lye tank, while the operator can use the hoist for putting another bucket into the pickle tank. In this way two buckets can be working all the time and expedite matters. It is also better to have two men working at it as they can do it better and more than twice as fast as one. Even if it does not take them more than four hours a day they can work on the scratch brush or do some other work when they get through with the pickle. That is the way I do it. Another reason is that it is a disagreeable job and one has a hard time keeping one man at it all day so I use two and get my day's pickling done in about four and a half hours per day, paying one man twenty cents and the other man fifteen cents per hour. Of course, this price will have to be governed by the rate paid in the locality for that kind of labor. I trust that if I have not made myself clear enough for those desiring to adopt this method that they will feel free to address me and I will give them any further information they desire.

THE MEANING OF ROLLED PLATE, GOLD FILLED AND SOLID GOLD*

A Clear Cut Explanation of Some of the Forms of Metal Stock Used in the Manufacture of Jewelry.

By George G. Wheeler.

HOW ROLLED PLATE IS MADE.

The purpose of this paper is to explain in simple language the difference between "rolled plate, gold-filled" and solid gold, by describing what each of these terms means. There is no intention of devoting any time to historical matters and the dates of discoveries and the names of discoverers of processes will be omitted. Jewelers may or may not be interested in history, but they are interested in practical matters concerning their trade.

"Rolled plate" is to many a misleading term. To those who understand it nothing could be plainer; but to one who has neither seen the process nor heard it clearly described it means comparatively little. Perhaps we can describe it so that its meaning will be apparent to all.

"Rolled plate" is made by soldering a sheet of alloyed gold to a bar of metal, of which copper is the principal constituent. The ingot thus made is rolled down to any desired gauge for use in the manufacture of jewelry and works of art. The rolling process gives rolled plate its name, but in reality very poorly describes it.

The making of rolled plate is an exact science. It is always made or "plated" at a certain definite quality. So carefully is this figured out, that when an ingot is rolled down to, say 3 per cent. of its original thickness in the bar, it will assay the same percentage of gold that was plated to begin with.

Let us imagine we are making an ingot of rolled plate while the process is being described. In the first place, we need a high degree of skill, for a plater soon finds that the utmost pains and ingenuity are indispensable if he is to turn out perfect stock.

First the gold must be alloyed, melted and rolled to the required thickness. Rolled plate is ordinarily made of either 12-karat or 10-karat gold, although occasionally a higher karat is used for some special purpose. Let us make, for example, an ingot of 12-karat one-tenth stock. The gold nine parts of composition, or plater's metal, and one part of 12-karat gold. The plater must weigh his bar of composition and divide it by nine in order to find what his gold must weigh. At first thought one would say divide by ten; but that is wrong, since there would then be ten parts of composition and one part of gold, making one-eleventh instead of one-tenth plate.

The sheet of gold and bar of composition are carefully prepared and clamped together with an extremely thin sheet of solder between them. The ingot is soldered off in a plating furnace and is then ready for rolling to any desired gauge.

The first rolling operation is called breaking down and requires rolling mills of great power. After annealing the stock is rolled to the finish gauge in rolls lapped to a mirror finish, suitable appliances being used to prevent rolling dust into the gold and also to avoid scratching and damaging the surface. The protection of this surface is the ceaseless task of the manufacturer of plated jewelry.

For some work, where both sides of the stock are exposed, double plate is required. The plater then solders a corresponding sheet of gold on to the back side of his ingot. It will be seen that in double plate the gold value is doubled and an ingot of one-tenth double has the value of an ingot of one-fifth single.

SEAMLESS WIRE.

Seamless wire is made from rolled plate, by cutting out a disc, drawing this disc up into a cup-shaped form with the gold on the outside. This cup is again drawn down by successive operations until the result is a tube of rolled plate with one end closed. This is still further reduced in size and at the same time lengthened in rotary reducers, and finally drawn down into wire which has a shell of gold all around it without break or seam.

Before the process of making seamless wire was developed it was customary to tube up a strip of rolled plate, bring the edges together and solder them. After soldering the tube was drawn down into wire and was called "Soldered seam" wire. Sometimes the seam was not soldered and the stock was known as "open seam" wire. Nearly all manufacturers today use seamless wire, though a few hold to the older methods as being more desirable.

It is apparent that rolled plate has a definite value, based upon the karat of the gold and the proportion of gold to composition. Furthermore, the durability of an article made of rolled plate depends upon the thickness of the gold. But we must go still further on this line,

*Address by George G. Wheeler, Superintendent of W. & S. Blackinton Co., North Attleboro, Mass., before convention of Illinois Jewelers' Association, La Salle and Peru, Ill., May 19-21, 1913.

for the thickness of the gold on a finished piece of jewelry also depends upon the gauge of the stock from which it is cut or stamped.

If a given article is made of one-tenth rolled plate, another article which requires stock of double the thickness would be made of one-twentieth, and so on. The practical manufacturer learns from experience just what quality he must use for a given gauge and figures his costs accordingly.

"GOLD FILLED."

With the hope that we have explained "rolled plate" with some degree of clearness let us take up the term "gold-filled." It is pretty generally acknowledged that this term was coined in the watch case industry, and was applied to stock made from two sheets of gold with a filler or stiffener of composition between them. It was certainly a good name, but the stock it described was nothing new. We have just described it; for it was nothing more nor less than double plate. The value of the name was soon recognized throughout the trade, and its application to any article having an outer shell of gold with an interior filling of composition was inevitable.

So general has the use of this term become, that today the method of applying the outer covering of gold is immaterial, so long as it is suitably applied and is of sufficient thickness to insure durability. The development of the electro-plating industry has made it possible to manufacture gold-filled articles with a great variety of beautiful finishes, ranging from Roman gold to dark green "antique" gold, and including rose gold, red gold, English finish, Colonial gold, sea green and even purple gold. These finishes are all made with various alloys of gold, and they have given to the jewelry industry an impetus which otherwise could never have been realized, owing to the beauty and variety of finishes obtainable.

THE ART OF ELECTRO-PLATING.

It is taken for granted that the general principle of electro-plating is understood by all jewelers. In case there are some who do not understand it, let it be said that the gold to be applied is dissolved by chemical means, the work to be plated is suspended in the solution thus obtained, and the introduction of the electric current causes the gold to deposit upon the work by galvanic action.

There are other ways of making a gold-filled article. Besides making it from rolled plate or electro-plate, there is the process of fire-gilding, now little used, but once very common. Certain clever artisans have devised, or claim that they have a method of depositing a shell of gold upon a piece of jewelry and then fusing the gold to the article by heat. This process doubtless is capable of practical development, but is not used to any extent at this time.

The value of a gold-filled article, like a piece of rolled plate depends upon the amount of gold on it. A cheap electro-plated article has such a thin coating of gold that it is described in the trade as a "shade." No better term could be used to describe it. On the other hand we see plenty of higher priced goods that have a coating of gold of sufficient thickness to leave a perfect, unbroken shell, if the interior metal is eaten out by acid, thereby proving the value of an article beyond dispute. This distinction cannot be too strongly emphasized, for too frequently we hear the remark, "Why, I can buy those same goods of so and so for half that price." Do not be deceived in this matter. Take one of the cheap ones and one of the more expensive ones and make the test. Then, and then only, will you realize the difference.

One would hardly expect to find any chance for argument in describing "solid gold." And yet there are few subjects offering greater opportunity for discussion. Strictly speaking, solid gold would naturally mean pure gold. Well, practically all the gold used in the arts comes from Uncle Sam's Assay office and it is not pure. Government gold averages about 997 one-thousandths fine, or about 99 7/10 per cent. pure. Some commercial refiners offer for sale chemically pure gold, but it costs more than the government price and is seldom used.

ALLOYS OF GOLD.

Fine gold, the stuff we are all after, is known in the arts as 24-karat gold. It is a very soft metal, totally unfit for use; even the United States Mint has to alloy the gold used for coinage, and gold coins are somewhere around 22-karat, the value being computed accordingly. Jewelry made of fine gold would be of no practical value, and could not be satisfactorily finished. Consequently, the practical jeweler alloys his gold down to a point where it becomes a durable metal, and anything better than 18-karat is rarely heard of. It may be well to explain in passing that 18-karat gold contains 18 parts of fine gold and six parts of alloy. Twelve-karat gold contains equal parts of gold and alloy. The stated karat denotes that a certain number of twenty-fourths of the article are fine gold and the remaining twenty-fourths are alloy.

Since gold is alloyed of necessity in order to make it workable and durable, it has come to be the usual practice to speak of articles made of alloyed gold as "solid gold." Certainly no harm can come from this practice, so long as it is perfectly understood. Of course the higher the karat, the higher the price, and a customer may suit his purse, knowing full well that a 10-karat article will save him much money on his purchase, and one of 18-karat will have the added intrinsic value resulting from the increased proportion of fine gold used. These are generalities, but they can hardly be ignored in treating this subject.

WHAT IS "SOLID GOLD"?

It seems perfectly fair and entirely honest to call an article "solid gold" provided it is of sufficient fineness to withstand the acid test, and avoid tarnishing in use. This point is held to be reached at 10-karat, and in this country 10-karat jewelry is honestly considered solid gold.

In Canada and in England 9-karat gold has official recognition, but we believe that 10-karat is as low an alloy as should receive the sanction of the jewelry trade. At the same time we believe that a 10-karat article is of such high merit that it is honestly entitled to be called "solid," and answers every requirement of beauty, durability and intrinsic value. The higher karats remain for those who seek the very best and have the means wherewith to pay for it.

In conclusion we are led to say what every jeweler will sooner or later attest; a low price is an indisputable evidence of inferiority. Rolled plate is worth the cost of the gold in it; gold-filled jewelry is worth more or less according to the coating of gold upon it; and solid gold is worth just what its fineness indicates it contains of the precious metal. From constantly dealing in jewelry in a common-place way, we overlook the fact that it is supposed to have gold in it or on it. We must be careful about making extravagant claims as to the value of articles that are sold so cheap that gold is an impossibility in their makeup. The laborer is worthy of his hire and the law says he must come first. Pay the price and you will get the goods. Your customers will get them in turn and they will be worth what you charge for them.

SCIENTIFIC MANAGEMENT

SOME GOOD ADVICE AS TO THE PRACTICAL AND SUCCESSFUL APPLICATION OF SCIENTIFIC PRINCIPLES TO A MANUFACTURING BUSINESS.

BY S. C. IMAN.

Scientific management, like the word Efficiency, has, to my mind, many ways of application, we no doubt have read numerous articles dealing with the most practical way to apply it to our works, and the chances are found some of them not up to the standard, in so far as direct results are concerned. It is not the writer's intention to for once and all times settle the question as to what scientific management is or how it is best applied; neither do I think for one moment that I am thoroughly acquainted with the entire problem. However, you will agree with me when I venture the assertion that as far as scientific management means taking care of your men as to their wages and environments, the cost of your product and the quality of your goods will be better and the figure that represents your earnings will be larger.

Main entrance doors cast in bronze for the Canadian Bank of Commerce, Winnipeg, Canada. The doors are 14 feet high and 8 feet 6 inches wide. They were designed and made by Bromsgrove Guild, Bromsgrove, Worcestershire, England, for Darling & Pearson, architects, Toronto, Canada.

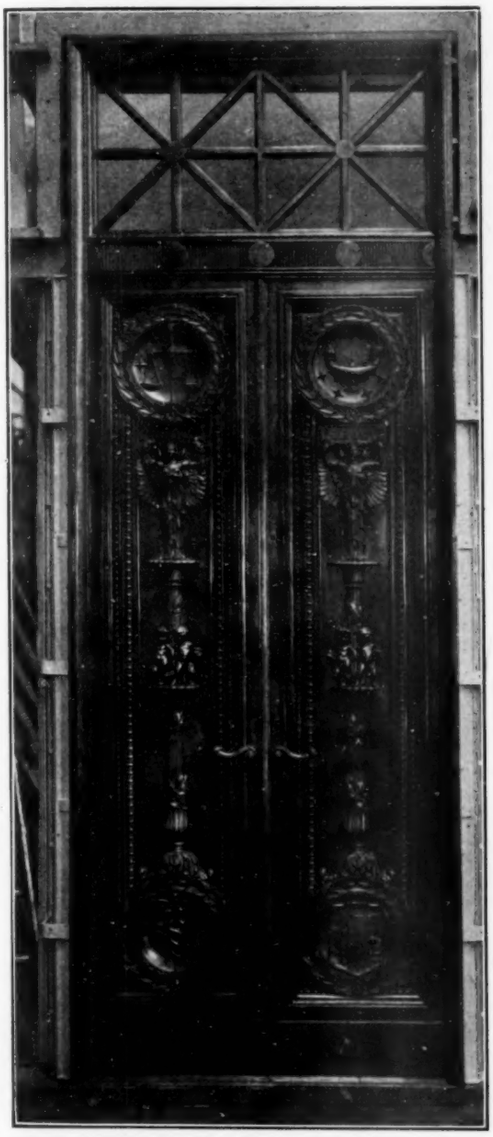
It is the aim of every manufacturer to make money and some go at it like the small boy on his first hunting trip who, being so enthusiastic over his first attempt, wanted to shoot a rabbit before he had his gun loaded. The result and the moral appeals to us all, "Be sure your gun is loaded before you attempt to shoot," and so it is with a great many men, the haste and fighting spirit that thrills us all in the chase of that almighty dollar will many times cause us to neglect the source from which it comes. Early pioneers of industry have given us much advice, some of which we must admit is good, but changes in the progress of the world have not seen like changes that go to make scientific management a success.

Of what I have read and know of some managers of different works, they seem to think that scientific management is cheap labor (forgetting, of course, the amount that the defective workmanship and material account will increase), and having all kinds of up-to-date machines, high-priced superintendents and surplus "mollycoddles" that only know they are living. The fact that "papa has stock," must make up for the brains that might have been theirs if they had not worked so hard when they were at college getting up to attend a 10 o'clock class and then fighting the whirls of pleasure and learning to push some fellow back a few yards in a football game; only to bloom out on the world worth about six dollars a week. I might add that if you figure that because you have a foreman or superintendent that is holding his job merely because he can bully the men that are in your employ and although he may be a good manager and have a general knowledge of your business you can readily figure that, although you can but see what he is doing, there are little things that are being neglected by your workmen. This is due to the fact that they are but human, and the things are too small for your immediate attention, but at the end of the year when your books are closed and your balance has been taken off, you are the loser. You might say that such things happen to any manufacturer, but why should they, if they give to their men the thought and care that is due them rather than spend enormous sums of money for experts to work out shop problems in regard to the output of machines, new machines, methods of handling material, etc.? You yourself can, if you will, figure that if your men were taken care of as regards their wages, surroundings, etc., once you have accomplished that problem you can readily convince yourself that you started at the wrong end to improve the conditions that hindered your success.

Permit me to give you an illustration of one kind of management that came to my notice through being acquainted with the party that this story surrounds. A large manufacturing plant had a department in its works sadly in need of a competent man to rearrange the department in general and increase the production and quality of the output. After securing the services of such a man and installing him as general foreman, please note a brief review of the results, the method of handling the men and also the results obtained. After looking over the proposition (we shall know our man as Mr. Smith) and getting a general idea of how bad a condition the equipment was in, the first thing that was done by him was to give the men an increase in their hourly wage, which is an unusual thing for a new man to do; however, the increase in the hourly wage of the men went through. Mr. Smith then had all the equipment put in good condition and the men readily assisted him in his task, and in a few months time had the department on its feet. There was money invested for repairs and new machines, all kinds of changes made (and changes surely do cost money), a large payroll and, in fact, the expense of running the de-

department had increased approximately 50 per cent., but getting over the result, we find that the increased production and quality of the product made by this department had more than made up for the extra expense that was incurred on what is termed scientific management.

Today the same conditions are found in this same department, the men are all treated fair, conditions that surround them in their daily work are such that they are not



Side entrance doors cast in bronze for the Canadian Bank of Commerce, Winnipeg, Canada. These doors are 9 feet high and 4 feet 6 inches wide and were designed and made by Bromsgrove Guild, Bromsgrove, Worcestershire, England, to the order of Darling & Pearson, architects, of Toronto, Canada.

dissatisfied, and like a horse that is well fed and treated with kindness, each man will surely put all that is in him to the task.

Another fair method of taking care of your men is that when a foreman is needed or a higher position is to be filled, a man is taken from the department and given a chance to fill the job rather than to advertise for some expert or man that has had years of experience. For I thoroughly believe that if a man is worth from ten to twenty dollars a month more to some other fellow for the same class of work that he is doing for me, he is worth that much more to me, and my duty is to see where I have made the mistake of not paying him the same wages.

Many manufacturers hire experts to tell them where they are at; sometimes this is necessary, and again many times it is not. It is up to you, Mr. Owner, Manager or Superintendent, to apply yourself to the study of human nature; start with the man that pulls your material around the floor; see if he is satisfied or merely putting in the time; find out if he is doing all he can to make his work efficient and not taking time required for two operations in doing one. Again analyze him as to his ability to do better, then increase his hourly wage. It will cost you, perhaps, two cents an hour more, but you will gain more than that, not only in money, but the fact that you have found out that you are not as big as you thought you were. Then find out if you are paying day work for jobs that you could put on piece work, and by doing so, increase the wages of your men and at the same time increase your output and profit. Also bear in mind that you have given your man an incentive to increase the quality of his work, take better care of his machine, and in general improve conditions that benefit you in many ways.

Some time ago I had the opportunity to hear from a friend of mine regarding the conditions he found upon visiting a manufacturing plant in the State of Ohio. Here is the story: "Upon approaching the plant I was surprised to note the beautiful condition of the ground surrounding the buildings, nice lawns and flower beds, and, in fact, beautiful to look upon. As I entered the building, my notice was drawn to a painting on the wall representing Capital and Labor standing hand in hand, and my first impression regarding their method of scientific management was certainly pleasing. After being shown through their works and then later talking to one of their managers, he advised me that it was their policy to take care of their employees by having such things as a dining room for them, where a good meal was given them at cost, good wages, and also maintaining a club in the country nearby as a recreation for them on half working days." Let me add that I know that the product which this firm manufactures is second to none; in fact, they sell them as fast as they can make them. I leave it to you to figure why, and draw your own conclusions as to their complete success in their business, but I think that you will agree with me when I say their success is due to taking care both physically and financially of their employees, upon whom they must rely for a good, partly good, or an inferior product. In conclusion, I would say that the success of scientific management in your plant will be measured by the thought and care that is accorded your employees; and bearing in mind that all things start with the man, not with the machine or material, as the machine and material, the operation and use of, being the work of the man and not the man being the work of the machine or material.

FELT WHEELS IN GERMANY.

Official statistics of the foreign felt trade of Germany do not differentiate felt wheels, but they are included under the general head of "Other felt goods not sewed." The imports for 1910 and 1911 were nominal, while the exports in 1911 were 1,408 metric tons (metric ton= 2,204.6 pounds), of a value of $1,415,386, as compared with 1,238 tons, of a value of $1,288,056, during the previous year. The principal countries to which the felt was sent in 1911 were: Great Britain, 351 tons; Brazil, 118 tons; Belgium, 77 tons; Switzerland, 78 tons; Sweden, 69 tons; Chile, 56 tons; Italy, 53 tons; Netherlands, 51 tons; and the United States, 47 tons.

THE CORROSION OF ALUMINUM*

AN ARTICLE DEALING WITH THE DETERIORATING EFFECTS OF CORROSIVE AGENTS ON THE METAL ALUMINUM.

BY G. H. BAILEY, D.Sc., PH.D.

(Concluded from May.)

LIMITATIONS OF THE METHOD.

It is important to know to what extent the attack on the metal is evenly distributed over the surface, or more or less confined to pitting and small areas. Such problems, however, cannot be elucidated except by the application of special and independent methods of inquiry.

The simpler question dealing alone with the extent to which good and well-annealed aluminum sheet is acted upon by various potable waters or solutions or reagents is one of supreme importance in regard to the commercial uses to which aluminum is put. I am also quite prepared to admit that in minor detils the method proposed may be open to criticism, and that the values it gives are in all probability somewhat too high. A considerable experience of its application in practice, however, indicates that under the variations which occur normally in the course of investigation and also in the hands of different observers comparable and reliable results are obtained.

EXPERIMENTAL RESULTS.

Below are given the amounts of corrosion of metal, having various grades of purity and character, during exposure to water and solutions of common salt. I have also added, although this contribution is not intended to deal with the action of acids and alkalies, a few instances illustrating by way of comparison the rate of corrosion by weak solutions of some acids and of caustic soda. Though in the earlier part of the paper I have expressed the results in milligrammes per day per 100 cm.², the data given below are stated in grains per day per square yard of surface.

INDEX FIGURE AND COMPOSITION OF SAMPLES.

Index Figue.	Silicon per cent.	Iron per cent.	Aluminum per cent.	Remarks.
1	0.26	0.47	99.27	....
2	0.17	0.18	99.65	....
3	0.19	0.28	99.53	....
4	0.26	0.31	99.43	....
5	0.30	0.52	99.06	0.116 per cent. sodium.
6	0.30	0.49	99.12	0.09 " "
7	0.58	1.25	98.17	....
8	0.59	1.84	97.57	....
9	0.20	0.60	99.20	Unannealed.
10	0.23	0.20	99.57	"
11	0.20	3.22	96.58	"
12	0.64	0.37	98.99	....
13	0.37	0.23	99.40	....
14	0.23	0.18	99.59	....

SAMPLES EXPOSED TO THE ACTION OF GOOD TAP WATER.

Index Fig.	Amount of Corrosion at 10° C.	Amount of Corrosion at 100° C.	Remarks.
1	1.0	3.3	....
2	0.75	2.6	....
3	0.85	2.6	....
4	0.80	3.0	....
12	0.85	2.5	In metal where the silicon exceeds the iron the corrosion products are almost entirely adherent to the metal.
13	0.75	2.6	
14	0.45	2.0	

*Paper read at the meeting of the Institute of Metals, held in London, March 11-12, 1913.

SAMPLES EXPOSED TO SOLUTION OF COMMON SALT.

Index Figure.	Amount of Corrosion at Various Concentrations. At 10° C. 1 per cent.	5 per cent.	10 per cent.	15 per cent.	At 75° C. 3 per cent.	15 per cent.	Remarks.
1	1.5	2.8	4.5	...	...	...	....
2	...	...	4.3	...	...	19.3	....
3	1.3	2.0	4.0	...	11.3	...	....
4	...	1.4	...	...	10.3	...	....
5	...	...	...	...	15.0	...	Contained much sodium.
6	...	...	...	...	18.6	...	Contained much sodium.
7	...	...	...	13.0	...	...	....
8	...	...	...	15.9	...	...	....
9	...	...	...	25.8	...	...	Unannealed.
10	...	...	...	24.0	...	...	"
11	...	...	...	55.5	...	...	"
12	...	8.5	...	...	...	...	....
13	...	6.5	...	...	...	...	....
14	...	6.0	...	...	...	...	....

SAMPLES EXPOSED TO VERY BAD TAP WATER.

These waters contained exceptionally large quantities of mineral matter, including alkalies; they had a distinctly alkaline reaction.

Index Figure.	Amount of Corrosion at Various Temperatures. Water A. 10° C.	Water A. 75° C.	Water B. 10° C.	Water B. 75° C.	Water C. 10° C.	Water C. 75° C.
1	2.3	15.8	3.2	23.2	3.3	19.3

COMPARATIVE STATEMENT OF RATE OF CORROSION BY ACID AND ALKALI.

Index Figure.	Good Water.	Decinormal H_2SO_4.	Decinormal HCl.	Decinormal NaOH.
1	1.0	3.5	21.0	770
4	0.80	10.0	35.5	708
12	0.85	7.7	29.8	898
13	0.75	5.0	19.0	868
14	0.45	6.1	11.9	836

GENERAL CONCLUSIONS FROM FOREGOING RESULTS.

1. That in general the greater its degree of purity, aluminum is less acted upon by water and salt solutions.

2. That in presence of copper or sodium the corrosion is notably accentuated.

3. That where the percentage of silicon is higher than that of the iron the action is less pronounced in the case of water and acids, and more pronounced in salt solution.

4. That water and common salt solution, from which air has been expelled, have no corrosive action.

5. That corrosion is accentuated (*a*) at high temperatures, (*b*) by the presence of impurities in the water, especially alkalies.

6. That unannealed metal is much more seriously corroded than annealed metal, owing no doubt to the unequal physical condition of the metal in the unannealed state.

7. That the results obtained by acting on aluminum with acids or alkalies afford no definite indication of its behavior in presence of water or aqueous solutions. Had it been possible to establish any parallel, the investigation

of the corrosion of aluminum would have been much simplified, since the difficulties presented by the formation of suspended or adherent deposit would be eliminated.

REFERENCES.

WATSON-SMITH.—"Action of certain Solutions on Aluminum and Zinc." Journal of the Society of Chemical Industry, 1904, p. 475.

CARPENTER AND EDWARDS.—Eighth Report of the Alloys Research Committee, 1907, pp. 216, 254 et seq.

F. VON FILLINGER.—Z. Unters. Nahr. Genussm. in 1908, p. 232.

J. T. W. ECHEVARRI.—"Aluminium and some of its Uses." Journal of the Institute of Metals, No. 1, 1909, vol. i., p. 125.

E. K. DAVIS.—"The Use of Aluminium for Non-Corrosive Purposes." THE METAL INDUSTRY, 1910, p. 109.

E. HEYN AND O. BAUER.—Mitteilungen der Königlichen Material prüfungsamt, 1911, p. 2.

THE ELECTRODEPOSITION OF NICKEL*

A PAPER GIVING A RESUMÉ OF PAST AND CURRENT PRACTICE IN THE ART OF DEPOSITING NICKEL ON METALLIC BASES.

BY OLIVER P. WATTS.†

ELECTRODEPOSITION OF NICKEL.

The quotations which follow give the opinions of different authorities upon the nature of electro-deposited nickel, and some of the difficulties encountered in plating with this metal.

Langbein says: "Hot fats strongly attack nickel, while vinegar, beer, mustard, tea, and other infusions produce stains; hence the nickeling of culinary utensils or the use of nickel-plated sheet iron for that purpose cannot be recommended." Bouant: "After having considered nickel as dangerous in the preparation of food, it is now recognized, on the contrary, to be harmless. Nothing prevents the extension of nickeling to utensils of copper, an operation doubtless more expensive than tinning, but giving much more durable results."

"To decrease the resistance of the nickel solutions, conducting salts are added to them, which are also partly decomposed by the current. . . . The use of sodium acetate, barium oxalate, ammonium nitrate, ammonium-alum, etc., we consider unsuitable, and partly injurious, and are of the opinion that with few exceptions potassium, sodium, ammonia, or magnesia, are best for bases of the conducting salts. The presence of a small amount of free acid effects without doubt the reduction of a whiter nickel than is the case with a neutral or alkaline solution. Hence a slightly acid reaction, due to the presence of citric acid, etc., with the exclusion of the strong acids of the metalloids can be highly recommended. . . . An alkaline reaction of nickel baths is absolutely detrimental."—Langbein.

"Lowering of the acidity, and elevation of the temperature, current density and nickel content of the bath tend to produce a fine-grained and matte deposit. Addition of alkalies and salts of magnesium have a beneficial effect. Addition of ammonium salts hinder the production of thick deposits. . . . Deposits from chloride solutions are always crystalline and coarser grained than those from sulphate solutions. Their hardness is about the same. The observation that the deposit from a chloride solution deteriorates more readily than one from a sulphate solution is explained by the difference in fineness of grain. In the presence of magnesium sulphate, the deposit contains 0.2 to 0.4 per cent. magnesium. This deposit is no harder than ordinary nickel plate, but is very flexible and well suited to the production of electrotypes. A bath containing magnesium salts ought to be more acid than other baths, to prevent the deposition of oxide. A higher acid content explains the fact that nickel deposited from solutions containing ethyl-sulphuric acid are very hard. Sulphate solutions give more flexible deposits than chloride baths. Deposits from solutions containing sodium salts are especially flexible, probably because of their finer grain. Iron renders the nickel deposit very brittle."—K. Engermann.

"A solution of chloride of nickel is used as electrolyte. By this method it is possible to prevent the contamination of electrolytic nickel with sulphur, as would be the case were a sulphate solution used as the electrolyte.

In spite of the recommendation by various experimenters of baths containing only nickel salts, there is a very general belief that for a successful nickel plating bath the salt of some other metal must be present, to form a double salt.

"Indeed it has been heretofore held as impracticable to nickel-plate with a single salt."—J. Yates. "On the other hand, the simple acid salts of nickel have not hitherto been found to answer for the purpose of electrodeposition, from the fact that such solutions refuse to yield a reguline or cohesive deposit of metallic nickel."—J. Powell.

A journal published a number of experiments with nickel sulphate solutions, made by an experienced practical plater to settle the question of whether or not single nickel salts can be used for plating. The conclusion is, "It is apparent, therefore, that single nickel salts cannot be used alone for plating."

The writer cannot subscribe to this result, for in 1904 he tried the deposition of nickel from a solution of 140 grams of commercial nickel sulphate per liter. Several trials gave black deposits, but finally a good deposit resulted. The solution was slightly diluted and 4 drops of sulphuric acid added. At the end of 38 hours electrolysis, with a current density of 5 amperes per square decimeter, falling to zero at the end, because of the complete solution of the anode, the deposit was excellent. Another trial of the same bath for 8 hours at 6 amperes per square decimeter gave a deposit of excellent appearance and firmly adherent. The current effieciency, however, was low.

Brochet says: "At the cathode the ion $Ni^{\cdot\cdot}$ ought to be discharged, and the metal pass into the molecular state and be deposited. In reality the reaction is much more complex, and the electrolysis of a pure salt of nickel generally gives poor results. With the sulphate there is the production of a slight black deposit, accompanied by an abundant evolution of hydrogen. With the chloride there is a deposit of nickel hydrate mixed with the oxychloride, and a similar evolution of hydrogen. A mixture of the sulphate and chloride of nickel gives much better results. The addition of an alkali-salt: potassium, sodium, ammonium, seems to be necessary to secure a good deposit; but then the series of reactions is entirely different. A complex salt is formed."

"It is a practice commonly adopted to momentarily use a high E. M. F. until the work is just covered with nickel,

*A paper presented at the twenty-third General Meeting of the American Electrochemical Society, at Atlantic City, N. J., April 3-5, 1913.

†Department of Applied Electro Chemistry, University of Wisconsin.

and then to reduce the E. M. F. This is called 'striking,' and 5 to 6 volts may for a few moments be used for this purpose. The E. M. F. is then quickly reduced to 2 or 3 volts."—Field.

It is well known that there is greater difficulty in obtaining a satisfactory deposit of nickel on some metals than on others. Sackur contends that: "A metal is more difficult to nickel, the farther its potential lies from that of nickel. Zinc, for example, possesses a higher electromotive force than brass, and this, in turn, more than iron. Potassium cyanide solution has a lower E. M. F. of decomposition than nickel chloride, and this again smaller than the sulphate. Good nickeling depends only on the choice of the right E. M. F., not upon the composition of the bath." This is an excellent illustration of the pitfalls of error which lurk within the covers of our electrochemical authorities—errors all the more insidious from the grain of truth in them.

One trouble, which was encountered in the earliest commercial nickel-plating, and it seems to have persisted to the present, in spite of the numerous remedies proposed, is the tendency of the deposit to peel off from the underlying metal.

In 1871 Keith says: "The objection to nickel-plated goods thus far is that the deposit is so brittle that it cannot be bent, nor on many articles stand necessary wear even if not bent, and that it will also scale or peel off." In spite of the cure for this trouble announced by Keith, Peters, writing in 1900, says: "When deposits of electrolytic nickel exceed a fraction of a millimeter in thickness they usually separate from the cathode in thin, brittle leaves."

"The usual methods of electrolytically separating nickel from aqueous solutions of its salts do not permit of the production of deposits of more than one-hundredth of a millimeter in thickness, since with a longer continuance of nickeling the layer formed comes off in thin scales. This disadvantage can be avoided by using a heated electrolyte, as has been long known; but a thick nickel plate thus produced shows a crystalline structure as compared with the rolled nickel of commerce, is very brittle, and is therefore not suited for direct manufacture or technical utilization without being first melted over again."—M. Kugel.

Turning from patentees, who may be regarded as prejudiced witnesses, we find D. H. Browne, saying: "The bug-bear encountered by all who attempt to produce sheets of nickel thicker than that used by nickel platers has been the tendency of nickel to crack and curl off in rolls, like wood shavings."

"Two of the difficulties which are often encountered in electroplating (with nickel) are either the formation of gray pulverulent deposits, or else the deposit does not adhere, but cracks and curls from the cathode. . . . The former difficulty has been found to be due to employing too high current density and too high E. M. F., whereas the latter difficulty is due to the electrolytes being too acid and at too low a temperature, or else to a film of grease or dirt on the cathode."—E. F. Kern.

"Nickel well deposited is extremely hard, so hard that it cannot be burnished, and is somewhat brittle. Thick coatings are especially liable to flake off in use, unless exceptionally well deposited, and even the thinnest films will part from surfaces which are not chemically clean."—McMillan.

The cause of this brittleness and peeling of nickel deposits is indicated in the following quotations: "Using a neutral or ammoniacal solution of pure sulphate of nickel there is an abundant disengagement of gas from the anode; soon followed by an increasing production of hydrogen at the cathode, and the deposited nickel becomes detached, curling up like wood shavings."—M. Gresy.

"The deposition of nickel requires a neutral bath. The presence of much free acid causes deposition of hydrogen, and the deposit of nickel in scales. Peeling of the nickel deposit is due to occlusion of hydrogen, which always exists in deposits of nickel and cobalt."—A. Brochet.

"It is commonly considered that the curling up of electrolytic nickel plate is due to the co-deposited hydrogen."—Schoch.

"The difficulty of obtaining thick nickel deposits is due to hydrogen evolved along with the metal and absorbed by it, causing brittleness."—A. Hollard.

Another trouble occasionally referred to is the formation of pits on the surface of the deposit.

"The trouble you experience from dark and pitted deposits is due to occluded hydrogen. This trouble develops when the solution is low in metal and hydrogen gas forms very rapidly upon the surface of the articles being plated. This gas theoretically burns holes in the deposit, causing the pitting noticed."

"The occlusion of hydrogen tends to make the deposit somewhat brittle, and more or less porous, and hydrogen gas clings to the surface of the deposited metal in the form of very fine bubbles, thereby making the surface more or less warty and rough. . . . By maintaining in the bath a small amount of material which will combine with free hydrogen, *e. g.*, chlorine, the occlusion of hydrogen, etc., is prevented. . . . The chlorine may be introduced as a gas, by adding fresh bath saturated with chlorine, or in case of a chloride electrolyte by using a small insoluble anode to which a portion of the current is shunted. Free bromine may be used, but gives inferior results."—T. A. Edison.

Photographs showing such pitting of iron and nickel deposits have been published.

The remedies most frequently proposed for the curling and brittleness of electrolytic deposits of nickel are strict neutrality of the bath, and electrolysis at high temperatures, varying between 30 deg. and 100 deg. C. H. J. Brownell secures a deposit of nickel which will stand drawing, bending, spinning, etc., of the plated metal. "The article to be plated being heated by immersion in water or otherwise to a temperature of nearly 100 deg. C. (212 deg. F.), and then subjected to a hot nickel-plating bath." Foerster, by heating from 50 deg. to 90 deg. C. an absolutely neutral bath containing 140 g. nickel sulphate per liter, obtained deposits 0.5 to 1.0 mm. in thickness. The current density was 2 to 2.5 amperes per dm. Other methods of preventing the curling of nickel, depending on the addition of particular substances to the electrolyte, will be mentioned later.

(To be continued.)

DUTY-FREE IMPORTATIONS.

Practically one billion dollars' worth of merchandise from foreign countries entered the United States free of duty in 1912. The exact figures, just completed by the Statistical Division of the Bureau of Foreign and Domestic Commerce, are $992,376,460, against $794,000,000 in 1911, $530,000,000 in 1905, and $342,000,000 in 1900, the value of non-dutiable merchandise imported having thus practically trebled in the last twelve years. The share which non-dutiable merchandise formed of the total imports in 1912 was 54.6 per cent., against 51.8 per cent. in 1911 and 49.2 per cent. in 1910. Included among the leading items on this free list is copper, $57,000,000, and pig tin, $50,000,000.

OLD SERIES. Vol. 19. No. 6. NEW YORK, JUNE, 1913. NEW SERIES. Vol. 11. No. 6.

THE METAL INDUSTRY

With Which are Incorporated
THE ALUMINUM WORLD
THE BRASS FOUNDER AND FINISHER
THE ELECTRO-PLATERS' REVIEW, COPPER AND BRASS

Published Monthly by
THE METAL INDUSTRY PUBLISHING COMPANY (Incorporated)

PALMER H. LANGDON - - - - - - - President and Treasurer
FREDERICK F. BURGIN - - - - - - - - - Vice-President
JOHN B. WOODWARD - - - - - - - - - - Secretary

Entered February 10, 1903, at New York, N. Y., as second class matter under Act of Congress March 3, 1879

SUBSCRIPTION PRICE, $1.00 PER YEAR, POSTPAID TO ANY PART OF THE WORLD. :: SINGLE COPIES, 10 CENTS
Please Remit by Check or Money Order: Cash Should Be Registered

ADVERTISING RATES ON APPLICATION
FORMS CLOSE THE FIRST OF THE MONTH

PALMER H. LANGDON - - - - - - - - Editor and Publisher
LOUIS J. KROM - - - - - - - - - - - Managing Editor
GEORGE W. COOPER - - - - - - - - - Advertising Manager
THOMAS A. TRUMBOUR - - - - - - - - Circulation Manager

ADDRESS ALL CORRESPONDENCE TO
THE METAL INDUSTRY, 99 JOHN STREET, NEW YORK
TELEPHONE NUMBER, JOHN 689 CABLE ADDRESS, METALUSTRY

CONTENTS

METALLURGICAL FALLACIES

How often do we see statements in the technical press and text books which are utterly at variance with the facts? Quite recently the old fallacy that there are two kinds of spelter, one made from ores, said to be primary, and the other made from zinc residues, said to be secondary, has been repeated in a report on the production of spelter by the United States Geological Survey. We expect a government department to be up to date in its statements. The inference is that spelter made from zinc ashes is inferior to that made from ores. So far from this being the case, distilled spelter made from zinc residues is far superior to spelter made from the average ore. The impurities in zinc residues are very minute compared with those in ores because they are largely eliminated in the original smelting from the ore. Of course, a "sweated" spelter obtained from hard spelter or a remelted spelter is not so good as a distilled spelter, but it is frequently superior to spelter obtained from ores. Is it not time that the term virgin spelter was dropped and spelter sold entirely on the basis of its zinc contents and impurities? This would do away with many anomalies in the buying and selling of spelter.

Presidential addresses to technical societies and the discussions on papers read before such societies frequently teem with fallacies, which show that the speaker is not a master of his subject. It is all right to speak from text books if one is certain that they are right, but how often are they totally wrong or copied from one book to another? The metallurgy of copper and its alloys is frequently misrepresented. How often are we going to be told that minute quantities of arsenic, antimony and phosphorus are injurious to copper without any qualifying statement? We are from time to time told that arsenic is injurious to gun metal, that antimony spoils it, and that phosphorus improves it by deoxidizing it. This is often repeated, notwithstanding modern researches and the best works practice. For the benefit of our readers who are unaware of modern views of gun metal let us state these cases in the modern views of the matters in question. Arsenic in copper to be used for making gun metal improves the quality of the gun metal and toughens it. Antimony up to 10 per cent. of the tin contents is not injurious to gun metal; it has no effect upon it. Many tons of gun metal containing tin replaced by 10 per cent. antimony are regularly sold without any complaint. The action of phosphorus on gun metal is due to its hardening properties. It does not deoxidize only to a certain extent. It toughens without of necessity deoxidizing.

Laboratory experiments on the metal copper and the effect of impurities on it must be received with a great

deal of reserve. We do not wish to discourage original research on this important subject, but investigators at our universities must bear in mind that laboratory experiments are not equivalent to actual manufacturing experiments on the large scale. It is possible to roll a specimen of copper or an alloy in a laboratory at a heat which practical men know from experience will not roll in works practice. There are so many factors to be taken into consideration in the works. In the course of hot rolling yellow metal the sheets are rolled together in several thicknesses and then torn apart by the rollers. If the mixture is about 61 per cent. copper the surfaces are quite smooth. If you give a roller a heat of 59 per cent. material he will generally say it is soft, and the surfaces are rough where they touch. A skilful man will try it at a lower temperature and eventually find the correct rolling heat. With a skilful adjustment of the heat it is possible to roll 3 or 4 sheets together and smooth down to as low as 56 per cent. of copper. It is to the skilled chemist and metallurgist who can solve such problems, in conjunction with modern machinery, that the brass trade must look for its dividends in the future. The days of rule of thumb have gone by, and the sooner our large manufacturers realize this the better it will be for the shareholders.

ERNEST A. LEWIS.

PLATERS' SALTS AND COMPOUNDS

We call attention to the letter published on the following page of this issue of THE METAL INDUSTRY from the firm of Hachmeister-Lind Chemical Company, Pittsburgh, Pa., manufacturers of platers' supplies. This letter throws a strong light on the question of platers' salts and compounds. This firm is to be congratulated on the stand they take in that they welcome discussion regarding the quality and fitness for certain purposes of the materials they offer for sale to the public. This spirit is quite refreshing in contrast to the attitude of some manufacturers who take the narrow ground that letters of complaint or criticism and subsequent discussion of the merits or demerits of their products can do nothing but injure them. THE METAL INDUSTRY does not believe that honest criticism can hurt any firm or product, but that on the contrary any meritorious and bona-fide article, machine or apparatus that is advertised for some specific purpose cannot fail to be benefited by frank, fair and dispassionate criticism or discussion. That "the proof of the goodness of a pudding is in the eating" holds good just as well for the manufacturer as for the cook. We again invite both manufacturers and consumers to send in their views, opinions and experiences in the use of platers' salts and compounds.

ELECTRO-PLATING LITERATURE

TO THE EDITOR OF THE METAL INDUSTRY:

In regard to correspondence of Mr. Emanuel Blassett, Jr., of Burlington, Vt., it need only be said that the gentleman in question should at least know what he is criticizing before entering upon such a tirade as appeared in the current May number of THE METAL INDUSTRY. None of the papers, as such, presented at the symposium on electro-deposition, before the Electrochemical Society had anything to do with electro-plating. In order to get a basis upon which to work it was deemed advisable to have all the available literature gone over and all of the methods (obviously silly ones included) which have been suggested for electro-deposition recorded. From these methods the committees are to select and determine standard baths from which these metals may be deposited. Other committees are to handle other phases of electro-plating. These papers, therefore, represent no original work and were never intended to represent that.

Mr. Blassett's conclusions are therefore of no value. To atone for this exhibition of hot-headedness, it is sincerely hoped that Mr. Blassett, as a loyal electro-plater and up-to-date scientist, will come forward with some modern information on electro-plating of any metals or alloys which may be of interest or use to these committees. I, as one of the committee to straighten out irregularities in solutions and questions as to what goes wrong with solutions when they fail to work, will be very glad to receive from Mr. Blassett any suggestions he may have to offer.

C. W. BENNETT,
Cornell University.

Ithaca, N. Y., May 29, 1913.

DEOXIDIZERS ALUMINUM VS. VANADIUM

TO THE EDITOR OF THE METAL INDUSTRY:

Among your inquiries published in the May issue, I notice that vanadium copper is recommended as a deoxidizer of aluminum bronze. I do not see exactly how this is possible, inasmuch as aluminum has more affinity for oxygen than vanadium. I do not wish to discredit, however, the use of vanadium as an alloy material, but have reason to believe that vanadium copper will not deoxidize an aluminum bronze. I would be very thankful for any explanation as to just how this deoxidization takes place, and just what effect the vanadium has, if any, upon the alloy.—SETH G. MALBY.

New York, May 26, 1913.

The statement made was based on the following experiment: An alloy was made of copper, 85⅝ pounds; aluminum, 9½ pounds, and 30 per cent. vanadium copper, 1⅔ pounds. The following results were obtained:

	Hot forged.	Cold forged.
Tensile strength.....	74,250	103,300
Yield point (elastic limit)....	34,000	95,500
Elongation in 2 inches.....	24.4	5.0
Reduction of area.....	24.0	20.5

A previous attempt to make the aluminum bronze without a deoxidizer was unsuccessful. I would suggest that the vanadium copper acts as a deoxidizer for the copper if not for the aluminum, and that the ductility of the above alloy was due to this fact.—J. L. J.

THE CLEANING OF GREY IRON

To the Editor of The Metal Industry:

In your issue of March, on page 118, there appeared an article by J. H. Hausjosten on "Preparing Grey Iron for Polishing and Plating." In it the author lays particular stress on the necessity of thorough cleaning of the work preparatory to plating, with which we must all agree, but in regard to the methods employed to accomplish this thorough cleaning, the writer from experience must take some issue with him. In the article he says, "The sand-blast will remove the sand and leave a clean metal background that will show up a good white deposit, but it will not remove the scale sufficiently, etc." Assuming this statement to be based on his own experience, it readily indicates acquaintance only with use of low pressure sand-blast, which he is correct in stating will not remove the scale.

FIG. 1. GREY IRON BEFORE BEING CLEANED.

With the modern high pressure sand-blast, every particle of scale can be removed, not only from grey iron castings, but from steel and forgings, the latter of which perhaps carry scale in largest quantity and with greatest tenacity. The two photographs, one showing a lot of automobile connecting rods before cleaning, on which the hard scale can be readily seen and another of the same work after it has been cleaned by the sand-blast, substantiate this claim. These two photos are taken at random from results on various lines of work which are constantly being obtained with our "Pangborn" high pressure sand-blast machines, this particular lot being cleaned in our self-contained sand-blast barrel. This thorough removal of scale by the high pressure sand-blast is of interest not only to the plater and polisher, but to the machinist as well, for it is a well known fact that a deposit of sand or scale is most detrimental to tools, and pieces thoroughly cleaned of scale and sand will not only machine faster, but with a corresponding saving on tools.

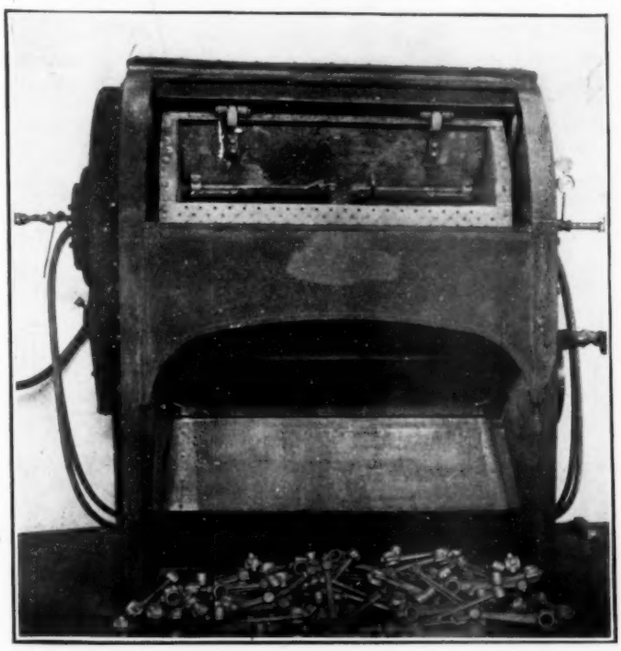


FIG. 2. THE SAME WORK AS SHOWN ABOVE AFTER COMING OUT OF THE HIGH PRESSURE SAND BLAST BARREL.

As a further confirmation of our contention, the writer recalls a plant recently visited where a given piece of work had been done by filing, the operators each cleaning sixteen pieces in a day, being paid 28 cents per piece. With the installation of the high pressure sand-blast, the pieces were cleaned in a period of three minutes, so that the filing labor was reduced that the per piece price dropped to 6½c., with the same rate of earning to the workmen. By the installation of the high pressure sand-blast in the plant referred to, a reduction of twenty-five men on the pay-roll ensued—a fact of interest to your readers in connection with the article first referred to, as bearing on the comparative economy of sand-blasting and pickling, or other methods of thorough cleaning.

H. D. Gates,
Secretary and Sales Manager,
Thomas W. Pangborn Company.

Hagerstown, Md., May 28, 1913.

PLATERS' SALTS AND COMPOUNDS

To the Editor of The Metal Industry:

Before we had a moment's spare time to look over your May issue, a plater acquaintance of our house informed us that our Chinisol had received a very black eye by the publishing of the S. M. Ferguson letter, foreman plater of the Great Western Stove Company. Our plater acquaintance argued we were getting very poor compensation for our money in having such letters published by your paper on our material. We could not agree with him, as an article of merit should stand every investigation and controversy.

We want to assure Mr. Ferguson that he, by submitting this letter to your paper, has opened a way for us to thoroughly thrash this matter out to the satisfaction of all and that we have only the best of feeling towards him, under the circumstances. It is a little early at the present date to get testimonials from our friends who have purchased the material on approval with conditions to return at our expense if found unsatisfactory. Of the buyers in February, March and April months, about 90 per cent. have paid their invoices in these three months. We have had only two packages returned, as per approval conditions of sale, but, on the other side, we have many repeat duplicate orders of those months, some ordering two barrels where their first order was one trial barrel.

Staple merchandise in the chemical line on absolute sales without approval conditions attached would have a hard time to show this satisfactory average. We know who is who in the plating line and we have sold a little Chinisol in the last four months (tons of it), so our Western friend might reconsider his opinion of our material. If he could make up his mind to give it another trial and follow our instructions closely, and will order a 224-pound package on approval at our expense, then build up a new tank of this material, he will see where he made his mistake in taking 50 pounds, of which his order of February 7, 1913, consisted. Adding this small lot to large tanks such as stove companies use, there would be no noticeable results until enough of the material was placed in an old solution.

We like to see these matters come up. It takes some of our limited time, but we believe it is well spent. Therefore, opinions from others would be appreciated. All we ask is to be fair and do not demand impossibilities. For the July issue, we will surely have gathered data enough to make this matter more interesting for all of us. For your paper, we must say you are following the only course to be fair to all. If we have a good thing, the plating trade cannot know it too soon. If otherwise, it should be the same way.

Hachmeister-Lind Chemical Company,
H. C. Hachmeister.

Pittsburgh, Pa., June 2, 1913.

Shop Problems

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE OF THE METAL INDUSTRY. ADDRESS THE METAL INDUSTRY.

ALLOYING

Q.—We manufacture brass hinges for water closet seats which contain 70 copper, 28 zinc and 2 lead, which works satisfactorily. However, we have tried a mixture of 65 copper, 33 zinc and 2 lead, but the castings are so rough that to polish them costs more than when using the better mixture; also the loss in the foundry is greater. Can you tell us how to overcome our trouble?

Q.—The mixture you use is rather sluggish, and the one you refer to as used by your competitors is even more sluggish. You can try skin-dried molds and the use of a very small amount of aluminum or manganese (not over one-tenth of 1 per cent.), but we think a better metal, such as copper 76, tin 3, lead 3, zinc 18, will prove to be the most economical in the long run.—J. L. J.

CLEANING

Q.—Please publish the most economical ways of cleaning brush brass work after being brushed by emery and oil.

A.—The most satisfactory method to cleanse brush brass work finished by the aid of pumice stone and oil is to wash in benzine or gasoline. Two washings should be given, one to remove the excess of oil and the second as a final cleanser. This is the only method that will prevent stains.

Many concerns are using the pumice stone and water method with tampico or bristle brushes. The articles only require to be washed in water and passed through a dilute cyanide dip to remove stains and then dried out by the aid of boiling water and sawdust. This method saves considerable expense over the oil method.

The benzine used in the first method can be used over again if contained in a tank and allowed to settle over night.—C. H. P.

COLORING

Q.—Can you tell me what I can use to bring a gold solution up clean and bright?

A.—If a gold solution is deficient in metal it will never produce a good clean yellow color. The deposit in such an event is like a dirty rose gold.

If you are satisfied that the trouble is not due to this reason, then the addition of ½ to 1 ounce of sodium bisulphite will clear up the solution and produce a clear deposit.—C. H. P.

COMPOSITION

Q.—Can you give me a formula for making Vienna lime finishing compound and also tripoli?

A.—Paraffine wax is usually used as a binder for Vienna lime compositions. Tripoli compositions are usually prepared by using mutton tallow and a proportion of paraffine wax as a binder. We are not familiar with the exact proportions used in preparing these compositions.—C. H. P.

DIPPING

Q.—Can you give me a formula for an ormolu dip, what to add if too rough and also what to add if not matt enough?

A.—Ormolu dips for articles made from cast or sheet brass are made up from nitric acid, zinc and sulphuric acid. The proportions vary according to the metal whether hard or soft.

The usual method is to dissolve sheet zinc scraps in nitric acid adding as much metal as the acid will absorb so that when the mixture is cold it has the appearance of a heavy whitewash. Oil of vitriol should then be added carefully, continually stirring the mixture, and a trial should then be made with the articles to be ormolued which should have been previously cleansed and regularly acid dipped. When the correct proportions of vitriol have been added an even velvety surface will be produced. This surface will appear earthy and the true color will develop after the articles have been washed in cold water and then dipped in potash, rewashed and then immersed quickly through a bright acid dip, washed again and then lacquered.

Some operators instead of adding metallic zinc to the nitric acid make additions of carbonate of zinc, oxide of zinc or sulphate of zinc. Whatever material is used the nitric acid should always be saturated with it.

It is customary to keep the ormolu dip hot. Quicker results are then obtained. The best method to use for this purpose is to surround the stone jar with hot water maintained at the proper heat with a small steam coil inserted in the water.

The following variations occur in ormolu dips:

1. If the dip when first prepared does not produce the ormolu surface add a little water and a very small amount of muriatic acid. This will start the action of the dip.

2. If the surface is too rough and crystalline add oil of vitriol a little at a time, with constant stirring until the proper surface required is produced.

3. If the surface is too smooth add nitric acid in small proportions with constant stirring until the proper surface required is developed.

The bright acid dip to be used in connection with an ormolu dip should consist of oil of vitriol, 2 parts, and yellow aqua fortis, 1 part. These proportions will preserve the ormolu lustre without producing too bright a tone.—C. H. P.

ETCHING

Q.—How can I make the stearin and graphite papers, which are used in etching?

A.—Stearin paper can be prepared by melting stearic acid so that the stearin is perfectly fluid, and then immersing the sheets of paper for a few seconds until they become thoroughly impregnated and then thoroughly drying them. Graphite paper may be prepared in the same manner by mixing floated Ceylon graphite with the stearic acid, or the sheets may be rubbed with the dry graphite as soon as they have passed through the solution of stearic acid and while still warm.—C. H. P.

GILDING

Q.—Kindly give me a gold dip for brass screws.

A.—Boil the following solution for one or two hours before using, replacing the water lost by evaporation when boiling:

Water	1 gal.
Carbonate of Soda	1 lb.
Yellow Prussiate of Potassium	½ "
Caustic Potash (in sticks)	4 pennyweights
Sesqui-chloride of Iron	1 "
Pure Gold reduced to a fulminate	2 "

Use this solution at not less than 180 degs. F. Brass screws should be bright acid dipped before gilding and passed through a dilute cyanide dip to remove any acid stains and washed carefully before immersing in the gold dip.—C. H. P.

MODELING

Q.—Will you be kind enough to give us a receipt for modeling wax?

A.—To prepare modeling wax melt together one pound of white beeswax and one ounce of diachylum, and to every five

pounds of the mixture add ½ ounce of brocus and 1.2 ounce of jeweler's gold rouge for coloring. It is advisable to remelt the wax after first prepared and cooled to improve it.

Diachylum is a substance used in the pharmaceutical trade. It is made by heating olive oil and red-lead until a soft substance is formed. It is plastic, but not sticky and its object is to reduce the granular structure of the beeswax and toughen it when melted together.—C. H. P.

PITTING

Q.—We are having trouble with our nickel solution pitting and cutting through. The solution stands about 7 degrees Baumé, and have been using boracic acid for a black. What would you advise? Would it be advisable to add molasses or soft sugar?

A.—Pitting of nickel deposits develops from several causes. Some of them are as follows:

The solution is too dense. A remedy for this is reduce with water to 5½ or 6 degrees Baumé.

Or too acid, causing too great an evolution of hydrogen, some of which becomes occluded in the deposit. Remedy: Reduce the acidity by adding ammonia or carbonate of nickel.

Solution too low in metal, add single sulphate of nickel.

To overcome the difficulty with your solution we suggest that you reduce with water to 5 degrees Baumé, then add 2 ounces of sal ammoniac to each gallon. The solution removed should be retained and then added at intervals to the solution when in correct condition.

We cannot recommend the molasses or sugar as an additional agent to nickel baths. These materials are frequently used in acid copper baths, but we have never heard of their use in nickel solutions.—C. H. P.

PLATING

Q.—We have been instructed to use sugar of milk in a bronze solution. Please advise me if this is correct.

A.—We think your informant is trying to play a joke upon you or you have made a mistake in the information he gave you. Acetate of lead is commonly termed sugar of lead and this is the material he probably refers to. This material is frequently used as a brightener when dissolved in caustic soda in copper and bronze baths. Care must be used in its addition or the color of the deposit will become considerably dark. From 4 to 8 ounces should be used to a 100-gallon bath.—C. H. P.

Q.—Please give me a good nickel solution for use in a Baird tumbling barrel and what anodes should be used? I would like to get a nice white deposit.

A.—Use the following solution with cast nickel anodes at a voltage of from six to eight:

Double Nickel Salts	8 ozs.
Single Nickel Salts	2 "
Sulphate of Magnesium	4 "
Water	1 gal.

—C. H. P.

REDUCING

Q.—Is there any method of melting zinc ashes assaying 65 per cent. without distilling, and if so what is this method?

A.—While zinc dross may be distilled directly, it is usually sweated in a reverberatory furnace, the liquated metal running into settling pans, and thence into a dipping pan. The residue or ashes are usually exported to Wales. These ashes consist chiefly of iron oxide and zinc oxide, and must necessarily be mixed with hard coal and smelted in order to again get metallic zinc.—J. L. J.

SHRINKING

Q.—Please inform of the average shrinkage per 100 pounds of red brass, yellow brass, copper red turnings, yellow turnings, and also when melting aluminum?

A.—The following figures represent the average melting loss of a large brass foundry using open flame furnaces: Copper, 1 per cent.; red brass, 1½ per cent.; yellow brass, 2 per cent. On copper turnings, the loss is 1½ per cent., on red brass turnings, 4½ per cent. (this includes 2½ per cent. of oil and dirt) and on yellow brass turnings, 5½ per cent. (this also includes 2½ per cent. of oil and dirt). The melting loss on pure ingot aluminum ought not to be over ½ of 1 per cent., unless the metal is required to be very hot.—J. L. J.

STRIPPING

Q.—Can you kindly tell me in your next issue, a good stripping solution for silver goods, brushes and mirrors, thin photo frames, cigarettes, etc.? At present we are plating the articles after polishing to hide the fire in them. The stripping solution I have been using used to make them rough.

A.—You do not state the composition of your dip for removing the fire from your silver goods.

If you are using the regular hot dip consisting of nitric acid, 2 parts; and water, 1 part, and the surface becomes rough after the fire is removed, it may be due to the fact that you immerse the articles too long. Try dipping them for a few seconds then remove, wash and immerse in boiling water. If the fire stain is not all removed, repeat the operation. In this manner you will avoid the roughness you refer to.

If you use a dynamo for plating prepare a solution of cyanide in water, 10 to 15 degs. Baumé, and use it warm. Arrange as a plating solution, only use the current reversed. A plating solution that is the positive pole should be arranged as the center pole and the articles then become the anode. The negative poles should be the two outside poles and pieces of sheet steel or carbon should be used. If a good strong current is used the fire stain should be removed in a few seconds and should be perfectly smooth.

If the acid dip does not prove satisfactory, try the electrical method as given above.

THREADING

Q.—Please give me full information in regards to the Whitworth standard, also the British Association standard, screw threads, and inform me what is the difference in same from the American standard screw thread used on all iron pipe and brass fittings.

A.—The Whitworth and English standard screw threads are not used to any great extent in this country unless by the manufacturers of plumbing and steam brass goods that export their goods to Europe, and they are all made up with the standard Whitworth thread. There are several manufacturers of brass goods who have adopted for certain parts of their work the Whitworth form of screw thread; that is, a thread of 60-degree angle, the threads rounded at top and bottom, while in some cases the threads are produced with a rounded top, but of V-shape at bottom. These special forms of thread are used more particularly on parts that are made from brass castings, it being claimed that it is difficult to produce a sharp V-thread on certain classes of brass castings, the tendency being for the metal to crumble, and with a sharp V-form of thread the edges of the threads are liable to be produced with considerable roughness, making the parts disagreeable to handle as well as presenting an unsatisfactory finish.

The Whitworth screw thread is cut on an angle of 55 degrees, while the standard V. and U. S. S. screw threads are of 60 degrees angle. The British Association standard is like the Whitworth standard, of round top and bottom, but is cut at an angle of 47½ degrees. The argument put forth for the use of the Whitworth and English standard screw threads are well founded, and that for certain work produced from gray iron or brass castings on which smooth perfect threads are desired the Whitworth thread or threads with round top and V-form at root, would appear to have the advantages claimed over a sharp V-form of thread.—P. W. B.

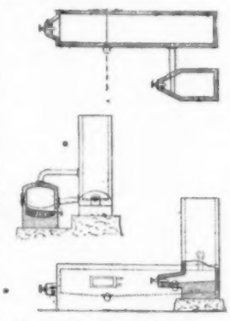
PATENTS

REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

1,058,941. April 15, 1913. **Process for Treating Copper.** David Wesley Blair, of New York, N. Y., assignor, by mesne assignments, to Metallurgical Research Company, of New York, N. Y., a corporation of Arizona.

This invention relates to a method of treating copper, and with respect to its more specific features, to a process for melting and refining copper.

One of the objects of the invention is to provide a continuous process of the type shown in cut, which will be simple and economical. Another object is to provide a practical and efficient process of the type described which will exert a minimum deterioration on the walls of the chamber in which it is carried out. Two of the claims are:

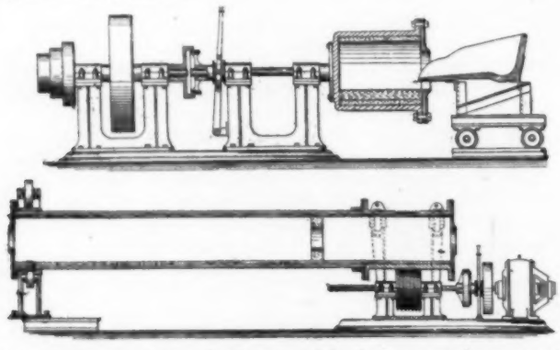


The process of treating copper, which consists in continuously melting copper in a chamber by means of the highly heated products of combustion of a hydrocarbon fuel, continuously removing the copper to a point exterior of said chamber, continuously delivering the copper into a refining chamber, heating the copper while in said refining chamber, subjecting the copper to the influence of carbon intimately commingled therewith, poling said copper, and continuously tapping said copper from said refining chamber.

The process of treating copper, which consists in continuously melting copper in a chamber by means of the highly heated products of combustion of a hydrocarbon burner regulated to produce an oxidizing atmosphere, thereby producing an amount of copper oxid in said copper, and liberating the oxygen from said oxid by commingling with the copper a quantity of carbon, and poling said copper.

1,058,250. April 8, 1913. **Process of Testing, Molding and Casting Materials and Apparatus Therefor.** William H. Millspaugh, Sandusky, Ohio.

This invention relates broadly to a novel method of utilizing centrifugal force in the treatment of metals and other materials, and in molding and casting metals, or other substances which are susceptible of being formed into definite shapes under pressure.



The invention also relates to and includes certain apparatus by means of which these objects may be attained.

The inventor claims: A hollow cylinder, means for rotating the cylinder about its axis, said cylinder being arranged to hold a mass of temporarily plastic material and to impart rotation to the mass, thereby subjecting said mass to the action of centrifugal force, means for dividing the inner surface of said cylinder in a plurality of longitudinal compartments open toward the axis of rotation and having their longitudinal axes parallel to said axis of rotation.

By the use of this machine shown in cut the present method of making seamless tubes may be revolutionized. A hollow billet can be made which afterwards can be drawn down to smaller diameters and thus eliminate the casting of the billets in chilled molds.

1,060,361. April 29, 1913. **Process of Manufacturing Plated Goods.** David G. Rea, of Providence, R. I., assignor to Theodore W. Foster & Bro. Company, of Providence, R. I., a corporation of Maine.

This invention has reference to an improvement in the process of protecting the surface of precious metal during the act of forming and securing the various parts of an article together in the construction of the article.

The object of the invention is to protect the precious metal surface against oxidation caused by the application of heat in soldering the parts together, also from scratches or other injury caused by the handling of the parts in assembling them.

The invention consists in the successive steps of the process, as shown in cut, whereby the surface of precious metal is protected during the assembling of the parts and in the removal of the protection.

Fig. 1.

Fig. 2.

Fig. 3.

The inventor says.

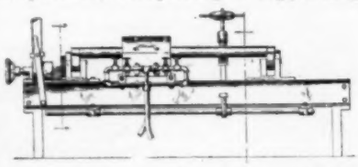
"In carrying out my invention I first form or shape the various parts necessary for the construction of an article of plated metal in the rough, that is to say—in a case—the sides, the lining, the hinges and the latch. I then electroplate the surfaces of these various parts with a base metal, preferably nickel. I then trim and fit the various blanks or parts and secure the various parts together by solder or otherwise to assemble the article. After the various parts have been secured together and the article is ready for the final finishing or polishing process, I subject the complete article to an electrobath and remove or strip the outer covering of base metal. In the case of the use of nickel, I remove or strip the nickel surface from the precious metal surface, leaving the precious metal surface in perfect condition for the polishing process, free from oxidation or injury incidental to the handling of the article during the assembly of the same."

1,060,365. April 29, 1913. **Tube Straightening Machine.** James Rowe, Chicago, Ill.

This invention has for its object to provide a simple and efficient machine for straightening tubing and the like. The particular object of the invention is to provide a machine, as shown in cut, for straightening tubes which is very simple and cheap and is easily operable to straighten tubes of different lengths and diameters.

The patent covers:

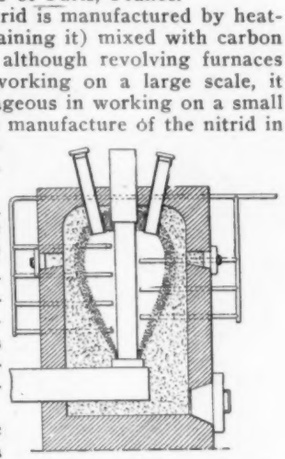
A machine of the kind specified, comprising a supporting bed, a member thereon equipped with two parallel shafts, a drive shaft geared thereto, rollers interchangeably mounted on said shafts and adapted to rotatably support one end of a tube, a carriage longitudinally movable on said bed, rollers interchangeably mounted thereon and adapted to



rotatably support the other end of said tube; a furnace slidable on said bed and through which the tube passes between its ends, a shaft carried by said bed and extending longitudinally thereof, an arm slidable on said shaft and adapted to swing on the axis thereof, a manually operable screw-shaft mounted in said arm, and a block adapted to rest on the tube and adapted to be engaged by said screw-shaft to bend the tube.

1,060,509. April 29, 1913. **Process for the Manufacture of Aluminum Nitrid.** Otto Kar Serpek, Paris, France, assignor to Société Generale Des Nitrures of Paris, France.

It is known that aluminum nitrid is manufactured by heating alumina (or substances containing it) mixed with carbon in a current of nitrogen. But, although revolving furnaces have given very good results working on a large scale, it appears that it would be advantageous in working on a small scale to be able to carry out the manufacture of the nitrid in stationary furnaces the construction of which demands little expense.



The object of the present invention is a process allowing of carrying out this manufacture of the nitrid equally well in stationary furnaces. For this purpose, there is employed an electrical resistance furnace, as shown in cut, the resistance being brought to the desired temperature by an electric current.

Nitrogen is supplied to the substances heated in such a manner that there are formed cavities around the electrode during the reaction. This result is obtained either by directly introducing nitrogen through the electrical resistance and allowing it to escape at the points where it is more particularly desired to obtain the cavities, or by passing transversely of the mass tubes leading to the immediate neighborhood of the resistance in order to allow the nitrogen to escape at this point. Owing to this arrangement, agglomeration of the nitrid against the resistance is avoided.

1,060,527. April 29, 1913. **Process of Extracting Tin from Base Bullion.** Brian Charles, Besley Howell, New South Wales, Australia.

The invention relates to the extraction of tin from lead or base bullion and it consists in a process in which the tin is extracted therefrom as an oxid by means of an oxid of lead. The process may be conducted in a pot or crucible, but in practice it is conducted on a large scale in a furnace of the reverberatory type. Rock salt or common salt is introduced into the furnace and brought to a liquid condition therein by raising and maintaining the temperature above its fusion point. For salt, borax may be substituted, but borax is objectionable on account of its relatively high cost and because it forms a slag with the bullion, from which slag the borax cannot be recovered economically. In practice rock salt is preferred because of its relatively low cost.

1,060,938. May 6, 1913. **Method for Tinning and Leading Metals.** Fritz Plathner and Victor Dorn, of Berlin, Germany.

This invention relates to a method of and powder for tinning and leading metals, and consists in tin or lead or a composition of the two metals being reduced to powder, mixed to a paint-like paste with a deoxidizing or fluxing substance in a neutral liquid which dissolves the fluxing substance, the paste being spread on the metal article to be tinned or leaded, and then heated to melting point.

EXAMPLE FOR TINNING.—A mixture of 2 kilograms of tin powder and one kilogram of powdered chlorid of zinc is mixed into a paste with ½ liter of water or alcohol, and the said paste spread in a thin layer on the article to be tinned. The layer in question is then heated by a flame until the tin powder contained therein is melted.

EXAMPLE FOR LEADING.—A mixture of 2 kilograms of lead powder and one kilogram of powdered chlorid of zinc or chlorid of ammonium is mixed into a paste with ½ liter of water or alcohol, and the article to be leaded, coated with the paste. The paste is then heated by a flame, until the lead powder contained therein has been melted.

1,061,089. May 6, 1913. **Electrolytic Solution for Cleaning Metallic Articles.** Alfred Levy, Paris, France, assignor to Alexander Waldberg, of the same place.

This patent covers a bath for the electrolytic cleaning of metals.

The following is a formula of a bath which gives excellent results:

Water	100 liters
Ferro-cyanid of potassium	1 kilogram
Caustic potash	10 kilograms
Chalk	1 kilogram

The ferro-cyanid of potassium in the above formula may be replaced by ferri-cyanid of potassium, and it is to be understood that the expression "prussiate of potash" used in the appended claims is intended to mean either the ferro or ferri-cyanid of potassium.

1. An electrolytic solution for cleaning metallic articles, comprising a prussiate of potash.

2. An electrolytic solution for cleaning metallic articles, comprising a prussiate of potash, with the addition of chalk, as and for the purpose set forth.

3. An electrolytic solution for cleaning metallic articles, comprising a prussiate of potash, caustic soda and chalk, as and for the purpose set forth.

1,061,674. May 13, 1913. **Rolled Metal.** Edward R. Hoyt, St. Louis, Mo., assignor to Hoyt Metal Company, of St. Louis, Mo.

This invention relates to the production of rolled metal for use in the manufacture of tanks or vats in which chemicals are placed, the object of the invention being to provide rolled metal of this description which, when used in a chemical tank or vat, has a thick inner layer of commercial lead with which the acid in the tank or vat contacts and a strengthening thin outer layer of lead alloy that is of such nature as to prevent the occurrence of corrosion at the exterior of the tank or vat.

Fig. I.

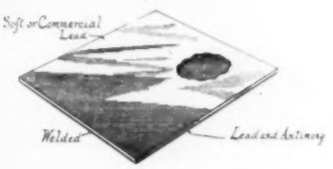
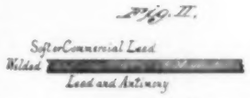


Fig. I is a perspective view of a rolled sheet of metal made in accordance with the invention and with one of the layers of the metal partly broken out. Fig. II is an enlarged fragmentary edge view of the sheet shown in Fig. I.

Fig. II.



In the accompanying drawings: 1 designates the thick inner layer of the layers of a sheet of rolled metal constructed in accordance with the invention and which consists of what is known to the trade as soft or commercial lead.

2 is a second thin outer alloy layer that is perfectly welded to the inner layer 1 and consists of an alloy composed of lead and antimony, the two layers being so united as to be distinct from each other and to prevent the commercial lead layer from being contaminated with antimony from the alloy layer.

1,061,447. May 13, 1913. **Method of Obtaining Zinc Oxid and Sinter from Alloys Containing Zinc.** Harvey M. Burkey, of Newark, N. J., assignor to Metallurgical Company of America, New York, N. Y.

This invention relates to the utilization of brass turnings and other brass waste, for the recovery, in the form of utilizable products, of the constituents of the alloy.

The patent covers:

1. The method of recovering zinc from turnings and other waste metal alloys containing it, which consists in mixing the turnings or the like with fine coal, and igniting and blowing the mixture under temperature conditions which will volatilize and oxidize the zinc, and which will leave a residual sinter, and recovering the zinc as zinc oxid; substantially as described.

EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

NEW DRILL SPEEDERS OR HIGH SPEED DRILLING ATTACHMENTS

The Graham Manufacturing Company, Providence, R. I., have just brought out a new line of drill speeders, or high speed drilling attachments. These are for use in drill presses of the larger class where small holes are to be made. The general

FIG. 1. THE SPEEDER AS MOST COMMONLY USED.

advantage of the contrivances is that they convert a slow-running drill press into one of high speed, thus saving the cost as well as space required for an extra high speed machine. In radial

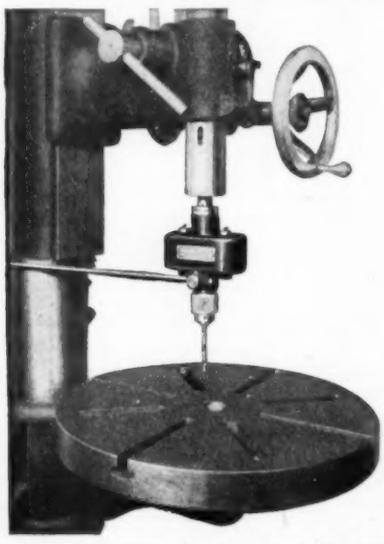


FIG. 2. SHOWING THE SPEEDER IN A 21-INCH DRILL PRESS.

drills a great many small holes for oil, dowels, set-screws, pins, etc., are made to much disadvantage if some increasing device of this nature is not used.

The attachments are intended for use in all drilling machines from 20-inch to largest radial. A little investigation will show that few of the upright type are speeded sufficiently fast for drills under 5/8-inch, and radials naturally run more slowly still. The idea of trying to run machines of heavy design at the high speeds required is not good practice—the bearings are too large, gears would make too much noise, and too much vibration would be set up in the vicinity of the machine. All styles of the attachments increase the speed three times.

Referring to the illustrations, Fig. 1 shows the style most commonly used. The shank is made in standard sizes to suit the holes in ordinary drill presses. On the bottom is fastened a regular drill chuck which revolves three times to once of the spindle of the main machine. Instead of the chuck, the spindle may be extended and made to accommodate taper shank

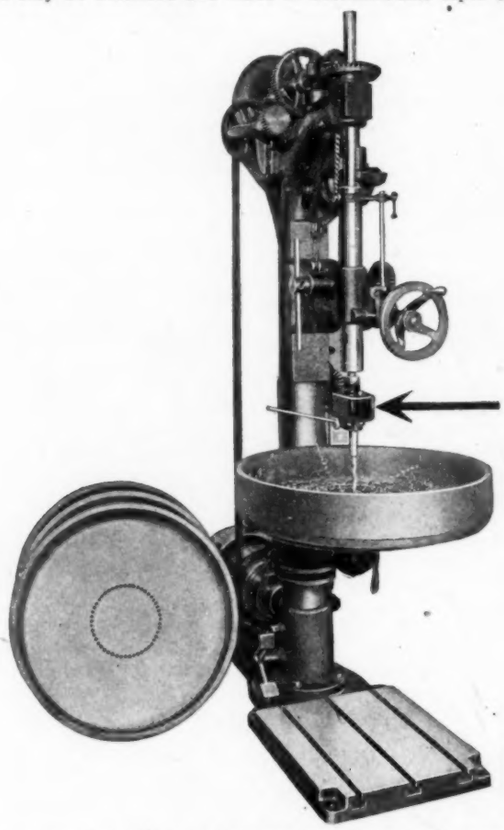


FIG. 3. AN EXAMPLE. DRILLING 7/16" HOLES IN BOILER HEADS 11/16" THICK.

drills. The driving mechanism that increases the speed consists of gears and pinions arranged in double, so that side strains are eliminated. There is no end-thrust conveyed through the case. A ball-bearing between the bottom of the slow-revolving shank and the top of the fast-running spindle releases all end strain. The alignment, which is quite important, is accomplished by extending the lower end of the shank downward inside the hollow chuck spindle until it is nearly as low as the bottom of the case itself. The spindle is further supported by a bronze sleeve on its outside.

Fig. 2 shows the speeder in a 21-inch drill press. A bar is fastened to the case by a thumb screw and extends to the

column to keep it from turning around. On radial drills some rigid object must be provided, or the bar may be held in the hand. In this particular speeder, the feeding of the drill is done by the feed mechanism of the main machine. Other styles have sensitive feed levers that permit of the feeding to be done by a racked sleeve within the speeder itself. An example of the device in action is shown in Fig. 3; here a boiler head 11/16 inches thick is being drilled by a 7/16-inch high speed drill, at a great reduction in the time required. Further information may be had by asking for catalog "M" from the Graham Manufacturing Company, Providence, R. I.

ARTISTIC METAL PIERCING

The cut shows a sample of the accurate and artistic saw piercing of metal now being done by the J. W. Colgan Company, Boston, Mass. The company claim that their process of saw-piercing has many advantages, which manufacturers should investigate thoroughly. In the first place it eliminates the great expense incidental to die work.

Secondly, there is no delay in getting out samples, which occurs when making samples by dies—as there is no waiting for the die to be made, and there is no danger of further delays, in breakage of dies, such as often occurs when making impressions from dies. Then again small quantities can be manufactured to the same advantage as larger ones, as each can be handled to the same advantage.

All work done by saw-piercing is accurate, as there is no drag to the design, such as occurs in punching work with dies. In this way the most intricate designs (which oftentimes it is impossible to punch out with dies) can be saw-pierced to the same advantage as simple designs. There is no design too simple or too fancy for this process, and by cutting several thicknesses of metal at the same time, the expense incidental to making goods in this way is very small.

This process will be found of great advantage to manufacturers who wish to get out samples before making dies, as several designs can be cut out, and the one best suited for the purpose can be selected from these, enabling the manufacturers to judge which is best to use, at a slight expense.

A SAMPLE OF ARTISTIC METAL PIERCING DONE IN BRASS.

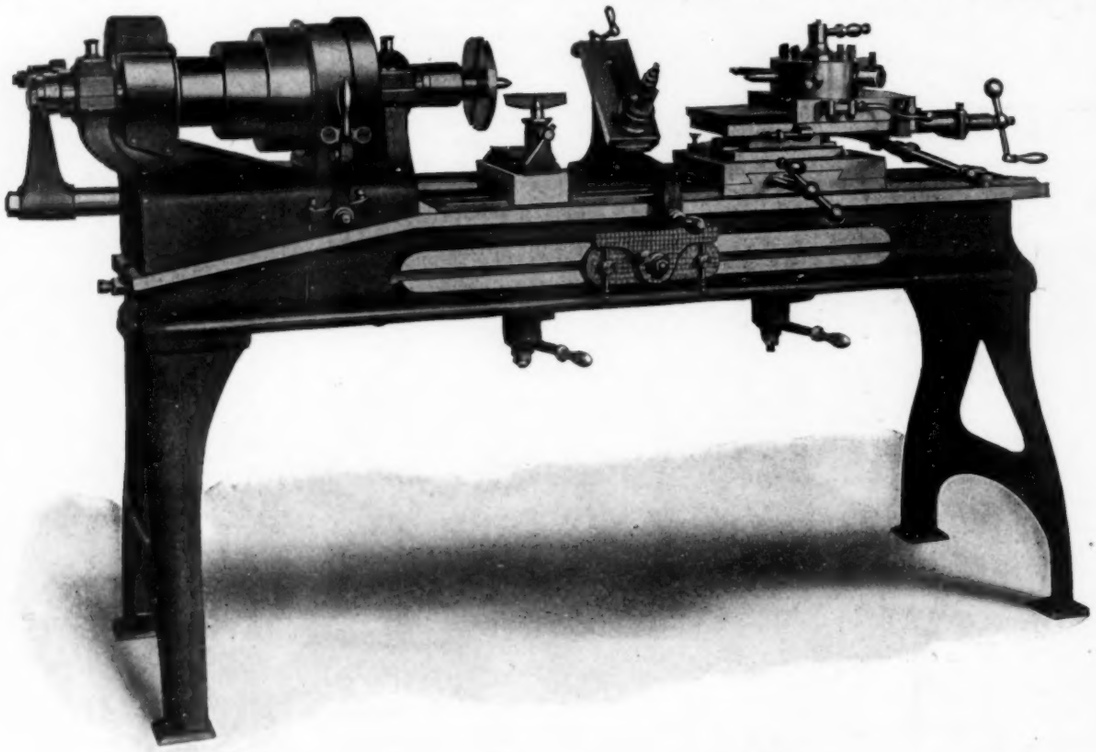
NEW GASOLINE BRAZIER

The Clayton & Lambert Manufacturing Company, Detroit, Mich., have recently placed upon the market their No. 105 gasoline brazier shown in cut. It is designed for heavy brazing, pre-heating surfaces and other work requiring an intensely hot concentrated flame. It is claimed by the makers that there is a growing demand for a portable brazier that will produce a large volume of flame for heavy work and this brazier is constructed to meet this demand. The burner is made with a powerful generator that superheats the gas producing a perfect blue flame of intense heat about 2 inches in diameter at the burner. This burner is swiveled and enables the user to point the flame in any direction as indicated in illustration and hold it there. The tank is 10 gallon capacity, heavy gauge with welded seams and galvanized inside and out. The No. 105 brazier is portable and is operated under a working pressure of about 75 pounds, which is easily produced by means of the powerful compound brass pump. A pressure gauge indicates the air pressure in the tank. The brazier can be operated in connection with a compressed air system if desired and the adjustable brazing tripod as illustrated is supplied with the complete brazier. The makers will be pleased to send booklet to those interested.

THE CLAYTON & LAMBERT PORTABLE GASOLINE BRAZIER.

THE FOX LATHE AND ITS DEVELOPMENT

Seventy years ago, in 1843, the name of George H. Fox first appears as a machinist, and he has a partner. Two years later he is running his own shop and in 1859 the lathe was first advertised, which in these seventy years has done so much to perfect and cheapen the manufacture of those constructions of cast brass and light iron that are sure to be a part of the daily product of every machine shop. A facsimile of this 1859 advertisement is shown in cut. At that time Mr. Fox had a partner, as the "& Co." signifies.

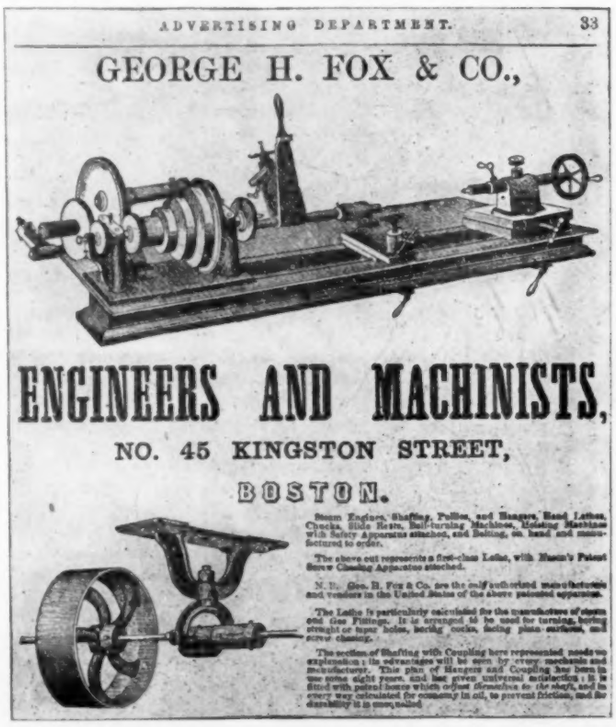


THE NUMBER 2 IMPROVED TURRET LATHE. AMERICAN TOOL AND MACHINE COMPANY, BOSTON.

Continuing with The American Tool & Machine Company, Boston, Mass., as president when the business was incorporated in 1864, improvements were made from time to time, different styles and sizes were added, until today the company's catalogue describes thirteen lathes, each adapted for some of the innumerable pieces of brass and iron that require more or less accurate finishing. In the advertisement mentioned the description of the lathe is clear and covers the features that have made it one of the essentials of every first class brass finishing shop. "The lathe is particularly adapted for the manufacture of steam and gas fittings. It is arranged to be used for turning, boring straight or taper holes, boring cocks, facing plain surfaces and screw chasing." The adaptation of the turret was merely adding a multiple tool holder as a supplement to the vital principles assembled in the original Fox construction.

From the beginning the construction and finish of the lathe has been of the highest type. This is evident from the small requirements in the way of repairs, the lack of their description in lists of tools in second hand stocks and in the continued use by some of the largest and best known manufacturers. Fox lathes made over forty years ago are still doing first class duty. It is rarely the case that a tool holds its own for so long a period and this continued popularity illustrates most clearly the unusual comprehension of the requirements of the brass finishing trade by Mr. Fox and his successors.

The illustration of the Number 2 improved turret lathe with friction head is one of the thirteen styles and sizes described in the catalogue of the American Tool and Machine Company. The Number 2 is as popular a lathe as any and will continue to do perfect work for more than an average lifetime. The inclined plane of the head stock allows the most delicate adjustment to compensate for any wear of the


ADVERTISING DEPARTMENT. 33

GEORGE H. FOX & CO.,

ENGINEERS AND MACHINISTS,

NO. 45 KINGSTON STREET,

BOSTON.

ORIGINAL ADVERTISEMENT OF THE FOX LATHE. DATED 1843.

V's. Journals run in large, self-oiling, adjustable bronze boxes. The hollow spindle has thrust bearing running in oil. The friction head device gives an instantaneous change of speed from direct high to slow, or back gear speeds. The possible product of a tool of this construction cannot be excelled in perfection or quantity.

The Fox lathe has gone all over the world; has been bought in finishing shops in this country and then demanded by the superintendent on his removal to Germany, and again when he became the master mechanic of railroad shops in New Zealand the Fox lathes followed him. It is probable that no better illustration can be given of the fact that it pays to buy high-grade tools than the continued demand for the Fox brass finishing lathe.

McADAMITE AND ITS PROPERTIES*

By J. P. Carritte.†

McAdamite metal is the result of several years of laboratory work with different alloys of aluminum and processes by William McAdams before it was put on the market commercially, and is an aluminum-zinc compound, with a special method in shop practice production for obtaining strong and superior castings. Aluminum and its alloys is a very interesting study, particularly in its elements of uncertainty, and the more experience one has had in its handling the more one realizes that there is much yet to learn regarding its possibilities. I have frequently had a pot of metal properly alloyed, fluxed, stirred, cleaned and skimmed, drawn under pyrometer, poured into two similar moulds side by side at the same heat and time, and widely different results obtained in strength determinations from the test bars in the different moulds—which is difficult to account for. To get best results the proper care and handling in the melting is really more important than the alloying. Some general shop practice rules that are well to observe to get best values in castings are to use special graphite crucibles, as aluminum has great affinity for iron and silicon which it quickly takes up and is detrimental, so iron and metal skimmers should be avoided and all stirrers, pots and receptacles of the molten metal should be well chalked or rubbed with graphite.

When the metal gets to a medium cherry red (not too bright), 1,300 to 1,400 degrees F. by pyrometer, it should be drawn and poured. If the heat must be held back briefly for any reason after it is ready, it should be covered with broken charcoal to prevent oxidation. When ready to draw, flux well with sal-ammoniac or chloride of zinc (½ ounce up to 25 pounds heat, and 1 ounce up to 80 pounds heat); get well down to bottom of crucible, stir and mix thoroughly, skim, draw and pour immediately, first clearing top of metal from any dross or dirt with a hard wood stick. Great care should be exercised in the use of scrap; only the gates, sprues, defective and broken castings (never use turnings, filings, etc., which take up iron from the tools and are hurtful to the metal), and on account of the extreme light weight it is necessary to make larger gates and sprues in order to have the hot metal run properly; the percentage, therefore, of this class of clean scrap in the regular casting process is greater than that of heavier metals. The metal will run up better, making more solid castings with large gates from the bottom, avoiding blow holes, carrying any air and dirt to the top risers.

The metal should not be left in crucibles under heat; always empty the crucible unless another heat is to be made in same immediately, when four or five pounds may be left in pot to start the next heat. Have as little metal left over from casting requirements as possible—gates, ingots, etc., etc. Every time aluminum is remelted it becomes more brittle. Any sharp corners in patterns (in molding) fillet, and heavy lugs or blocks of metal in connection with thin sections, chill well, which will help prevent cranks and shrinks.

The extra strengths obtained in McAdamite castings are not only in the alloy but more largely in the handling of the hot metal in the casting or moulding process—by the very rapid extraction of the heat, creating a more dense, close grained and homogeneous metal; the slight excess in weight, therefore, being very much more than offset in value by the greatly increased strength and toughness. This is obtained by using a moulding composition of carborundum, carbon, French clay, charcoal, etc., etc., in the same manner as ordinary sand practice. The same results from quick chilling would be accomplished by pouring into iron moulds, which would involve, however, greatly increased expense and would be otherwise impracticable through the heating up of a metal mould on the first pour and thereafter losing the necessary quality of rapid heat extraction. In one of our circulars is published a comparative table with other metals, the determinations of Prof. Collins P. Bliss of the University of New York, showing strengths of:

Tension	44,250	pounds per square inch
Compression	126,000	" " " "
Transverse	87,200	" " " "
Torsion	60,000	" " " "

We have tests even beyond this by Prof. Henry Souther, Hartford, Conn.; Carnegie Institute, Pittsburg, Pa.; Mechanics Institute, Rochester, N. Y.; Stevens Institute, Hoboken, N. J.; Dr. Chas. F. McKenna, New York, and other leading authorities. It must be remembered that these are laboratory tests, made with the very purest metals with extreme care, poured at the proper heat, which has much bearing on the strength values of the castings; regular run of shop practice castings where 20 to 30% of heat must be worked in scrap (gates and sprues) will hardly show as extreme strengths, but under our special practice McAdamite castings will average 33-1/3% stronger in all directions than what is commercially known as No. 12 or the ordinary aluminum-copper alloys. In many quarters there is a strong opposition to aluminum-zinc alloys, while many eminent metallurgical authorities insist upon their superiority. I think it is largely a question of prejudice, resulting from our different schools, surroundings and associations. Our experience is strongly in favor of the superiority of a proper zinc element and our several standard alloys contain from 6 to 27% of the purest zinc (Bertha Spelter) according to the nature of the duty, or stress and strains or application for which the casting is intended.

We have a result from Prof. Henry Souther on his special machine for crystallization under endurance or vibratory stress where he obtained 12,234,600 revolutions on a McAdamite bar before failure under load of 30 to 45 pounds. This is greater than any similar record from any other aluminum product. Another demonstration of the great strength of McAdamite is to tap a piece into which any size of ordinary or standard steel bolt can be broken without disturbing the McAdamite threads whatever. Considering that the specific gravity of McAdamite is around 2½ times less than the steel bolt, this is quite interesting, and I have never seen any other product or alloy of aluminum that would withstand this severe strain. It is also an excellent anti-friction metal. Mechanics like to handle McAdamite on account of its ready tooling qualities; it machines rapidly and easily, takes a fine finish and polish which it holds well against atmospheric and most elements, acids, etc., etc., except muriatic and strong alkalies which are inimical to aluminum. It can be plated, enameled or given any finish, which is largely a matter of proper cleaning, and some very handsome work of this kind is produced by the Eastman Kodak Company, The Burroughs Adding Machine Company, and others.

We have also developed a solder that is a success and will solder other metals to aluminum; a great trouble heretofore having been that the many aluminum solders would do everything else but solder and hold.

A friend of mine, an eminent automobile engineer, a chronic pessimist and extremist with very strong prejudice against aluminum, says that it is no good—that aluminum is only mud, that it never was nor never will be anything else but mud. Well, a basic metal that shows an increase in the United States from 83 pounds in 1883 to some 60,000,000 pounds last year,—in thirty years from nothing to a consumption this year that is estimated will run well up to 100,000,000 pounds in this country, surely must be "some" mud! That man is still having his crank cases made in bronze, but we have hopes of converting him and he shows increasing signs of weakening.

*Extracts from discussion on Aluminum before the Society of Automobile Engineers, Detroit, Mich.

†General Manager, United States McAdamite Metal Company.

Associations and Societies

REPORTS OF THE CURRENT PROCEEDINGS OF THE METAL INDUSTRY ORGANIZATIONS.

AMERICAN SOCIETY FOR TESTING MATERIALS

President, Robert W. Hunt, New York; Secretary-Treasurer, Edgar Marburg, University of Pennsylvania, Philadelphia, Pa., to whom all correspondence should be addressed. The Society is affiliated with the International Association for Testing Materials and is a corporation formed for the promotion of Knowledge of the Materials of Engineering and the Standardization of Specifications and the Methods of Testing. Meets annually, the time and place being fixed by the Executive Committee.

The activity of the society since the beginning of the year has been centered in its various technical committees which now number 35. These committees have held frequent meetings in different cities and the results of their labors will be presented at the approaching annual meeting of the society, which will be held at Atlantic City, N. J., on June 24-28, 1913. The matter to be presented at the 10 sessions of this meeting under 66 titles exceeds, in scope and volume, all previous records of the society. Sixteen proposed new standard specifications will be submitted for adoption by letter ballot as well as proposed revisions in 19 of the 52 present standard specifications. Among the proposed new specifications those relating to Electrolytic Copper-wire Bars, Cakes, Slabs, Billets, Ingots and Ingot Bars, and Lake Copper-wire Bars, Cakes, Slabs, Billets, Ingots and Ingot Bars are probably of greatest interest to the readers of THE METAL INDUSTRY.

AMERICAN INSTITUTE OF METALS

President L. W. Olson, Mansfield, Ohio; Secretary and Treasurer, W. M. Corse. All correspondence should be addressed to the Secretary, W. M. Corse, 106 Morris avenue, Buffalo, N. Y. The objects of the Association are for the educational welfare of the metal industry. Annual convention with the American Foundrymen's Association in a succession of cities as invited. The next convention will be held at Chicago in October 13-17, 1913.

Secretary Corse reports that the Spring meeting of the Executive Committee was held at the Fort Pitt Hotel, Pittsburgh, on Monday, March 10. There was a very good attendance at the meeting and much interest manifest in the affairs of the institute. It was decided to circularize various mailing lists for new members, using the various vice-presidents' offices as centers for distribution. It was decided to ask for a recommendation of two members or three persons non-members on all applications for membership. The secretary reported that the transactions were now back in his hands and a bound volume should be issued in about 60 days. The meeting of the committee to co-operate with the Bureau of Standards was held the next morning at the Arsenal with all members present. Mr. J. E. Howard, of the Bureau of Standards, represented the Washington office. Mr. Bates, in charge of the work at Pittsburgh, was present. Mr. C. P. Karr, who was appointed as metallurgist of the bureau to carry on the work, attended the meeting. The bureau has installed a small foundry for experimental work under Mr. Karr's direction. The first alloy to be studied will be the standard Government mixture, consisting of 88 parts copper, 10 parts tin, 2 parts zinc. A number of test bars will be made and the various properties of the alloys studied. This will be repeated with other standard mixtures later. After that, the effect of small variations of composition will be studied and a very carefully compiled record of the results tabulated. The committee is very enthusiastic about the outlook and believes that a very valuable work has been begun. It is particularly gratifying to see the interest that the Bureau of Standards is taking in this work, for upon them, of course, depends the success of the undertaking.

New members added: William B. Price, Chief Chemist, Scovill Mfg. Company, Waterbury, Conn.; Peter S. Braucher, Supt. of Foundries, P. & R. Ry. Company, Reading, Pa.; Fred. L. Wolf, Chief Chemist, The Ohio Brass Company, Mansfield, Ohio.; G. D. Chamberlain, Chief Chemist, Carnegie Steel Company, Braddock, Pa.; National Lead Company (Rep. by W. A. Cowan), 129 York street, Brooklyn, N. Y.

AMERICAN ELECTRO-PLATERS' SOCIETY

(AN EDUCATIONAL SOCIETY.)

President, Geo. B. Hogaboom, New York; Secretary, F. C. Clement, Philadelphia, Pa. All correspondence should be addressed to the Secretary. The objects of this society are to promote the dissemination of knowledge concerning the art of electro-deposition of metals in all its branches. The society meets in convention in the spring of each year, subject to the decision of the executive committee. The next convention will be held the first week in June, 1914, at Chicago, Ill. The branch associations hold monthly and semi-monthly meetings in their various cities.

On June 1, 1913, the National Electro-Platers' Association of United States and Canada became known as the American Electro-Platers' Society. On that date the officers elected at the first national convention assumed office, and they are as follows: George B. Hogaboom, New York, president; J. H. Hansjosten, Chicago, first vice-president; W. S. Barrows, Toronto, second vice-president; F. C. Clement, Philadelphia, secretary; John J. Schultz, Detroit, treasurer; H. E. Willmore, Chicago, editor. The members of the executive board will be announced as soon as the new constitution is adopted.

The New York body became the New York City branch. The present membership is composed of members all over the United States and Canada, and while the New York City branch is desirous of retaining the membership of all the present members, the opportunity is now given for any one to become the member of any of the other branches.

Branch societies are now in the following cities: New York City; Philadelphia, Pa.; Newark, N. J.; Rochester, N. Y.; Toronto, Can.; Detroit, Mich.; Dayton, Ohio,; Chicago, Ill.; Indianapolis, Ind.; St. Louis, Mo., and Milwaukee, Wis.

The regular meeting of the Philadelphia branch was held Thursday, May 29. The electro-chemistry meetings were discontinued during the summer months. Change of meeting night was discussed and also the use of the volt and ammeter.

One of the results of the joint discussion of the American

Electro-chemical Society and the National Electro-platers' Association (the American Electro-platers Society) at Atlantic City, N. J., April 5, 1913, was the appointing of a committee to study the needs of the electro-plating industry from a technical point. The committee appointed will work with a committee to be appointed by the American Electro-platers' Society.

Dr. Wilder P. Bancroft, Cornell University; Charles H. Proctor and George B. Hogaboom, New York, were appointed on the committee. Dr. Bancroft will have the following men to assist him: F. Austin Lidbury, manager, Oldbury Chemical Company, Niagara Falls, N. Y.; Prof. Frank C. Mathers, Indiana University, Bloomington, Ind., and Prof. Francis C. Frary, University of Minnesota, Minneapolis, Minn.

THE FOUNDRY AND MACHINE EXHIBITION COMPANY

Secretary Hoyt has just issued a handsome 100-page prospectus of the 1913 exhibition to be held in Chicago in October, 1913. This is the best bulletin of its kind ever issued and is full of information relating to former exhibitions and plans for the coming one. The secretary will be glad to send copies to anyone interested in the exhibitions.

Dr. Charles P. Neil, United States Commissioner of Labor since 1905 and recently made commissioner of labor statistics, has resigned to take a position with the American Smelting & Refining Company as director of its labor bureau.

Dr. E. F. Roeber, editor of Chemical and Metallurgical Engineering, New York, was elected president of the American Electrochemical Society at its recent meeting at Atlantic City.

W. J. Allen, foreman plater of the Clayton & Lambert Company, Detroit, Mich., has become connected with the Keeler Brass Company, Grand Rapids, Mich., in the same capacity.

DEATHS

CHARLES HENRY PARSONS

The industrial and manufacturing world lost a great and capable leader and worker with the death of Charles Henry Parsons at his home in New Britain, Connecticut, on Sunday, April 13. Mr. Parson, by his indomitable will and efficient performance of his duties, had worked himself up until at the time of his demise he was the first vice-president of the American Hardware Corporation. Born in New Britain in 1847, he attended high school and later a business college until he accepted a position at the post office. At the age of twenty he entered the employ of Landers, Frary & Clark as a salesman and held that position until 1873 when he accepted a position with P. & F. Corbin as their representative in New England and Canada.

With the incorporation of the American Hardware corporation in 1902 Mr. Parsons was made the assistant treasurer. Later he was elected second vice-president and at the death of the late Hon. Philip Corbin he was raised to the position of first vice-president, which position he held until his death. Besides a few other relatives Mr. Parsons is survived by four sons: Charles B., his own successor as the head of the P. & F. Corbin branch of the American Hardware Corporation; Howard S., who covers his father's old territory as salesman; Robert M., manager of the New York store of the Stanley Rule & Level Company and Munroe, a student preparing for Yale University.

J. A. LEBKUECHER

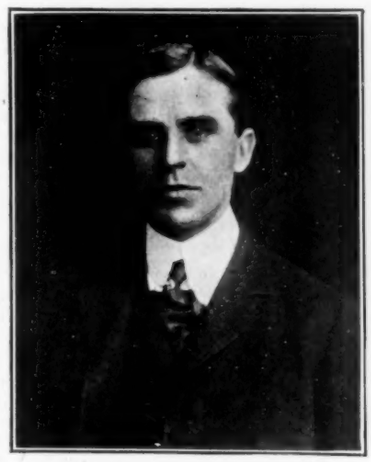
Julius A. Lebkuecher, formerly mayor of Newark, N. J., died May 13, 1913, in his home, at No. 160 Clinton avenue, that city, after five years of illness from a complication of diseases. He was born in Baden, Germany, on February 9, 1844. He learned the jewelry trade and in 1869 he and his cousin, Mr. George Krementz, formed the jewelry manufacturing firm of Krementz & Company.

In 1894 Mr. Lebkuecher was elected mayor of Newark on the Republican ticket, having been selected as a compromise candidate by warring factions of the party.

He was a member of the Newark Board of Trade, vice-president of the Union National Bank, director of the Franklin Savings Institution and director of the Fourteenth Ward Building and Loan Association. He was a member of the Essex Club, Oriental Lodge of Masons, Royal Arcanum, Arion and Eintracht singing societies and German Pioneer Society. A wife and two sons, Messrs. Frank A. and Carl L. Lebkuecher, survive him.

WALTER B. MAYNARD

Walter B. Maynard, formerly a resident of Waterbury, Conn., died at his home in New York on Saturday, May 17, 1913. Mr. Maynard was born in Taunton, England, on April 11, 1868, and came to America about twenty-five years ago.



WALTER B. MAYNARD.

Mr. Maynard was well known in the brass industry, having been connected for a number of years with the Randolph-Clowes Company, Waterbury, Conn., and after representing this company in Boston and New York he became, eleven years ago, a member of the firm of Arthur T. Rutter & Company, steel and copper brokers, 256 Broadway, New York, and with whom he was actively engaged at the time of his death. He was also secretary and director of the Hudson Wire Company, president of the Hudson Metallic Manufacturing Company, of Hudson, N. Y., and treasurer of the Industrial Development Company, of New York. He leaves a wife and son.

F. N. GARDNER

F. N. Gardner, president of the Gardner Machine Company, Beloit, Wis., and a prominent figure in the machine-building industry, died on May 11, after a brief illness.

Mr. Gardner was born in Ashfield, Mass., 63 years ago, and began his western career in 1888. In 1890 he became superintendent and general manager of the C. H. Besly Company, in which position he continued until 1905 when he established the Gardner Machine Company. He is survived by his wife, two daughters and five sons.

Trade News

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS AND TRADE ITEMS OF INTEREST FROM THE DIFFERENT INDUSTRIAL CENTERS OF THE WORLD.

WATERBURY, CONN.

MAY 31, 1913.

Perhaps the greatest interest in things industrial hereabouts has been taken, during the past month, in the progress of the New England Watch Company. This concern has been in the hands of a receiver for a long time. Franklin A. Taylor, formerly vice-president and general manager of the Randolph-Clowes Company, is the receiver, with John P. Elton and Harris Whittemore. The receivership began with a number of mild sensations, including the dismissal of some of the men longest identified with the management. Of course, there were removals also in the shop, some of the best-known hands resigning and others being discharged. Then business seemed to pick up well for the company. Considerable stock which had been stationary for many months, and some for much longer, began to move. During the past two months there has been a slump and, while there has been enough to keep the plant running, although with a largely reduced force, the eve of Memorial Day brought out the announcement that the shop would be shut down until June 16.

This step is taken by direction of Judge Lucien F. Burpee, of the New Haven County Superior Court, at the request of John P. Elton and Harris Whittemore, the two most prominent stockholders at present, and Mr. Taylor. Incidentally the receiver is given power to dispose of the property formerly owned by Charles S. Chapman, whose connection with the company was ended when the present management began. This is a handsome residence in an exclusive section of the city. The company secured it through a mortgage deed amounting to $7,500, and as the income from it is but $30 a month, and the property is worth at least $10,000, the court ordered its sale. At the same session of the court an order was issued permitting E. L. Welsh, executor of the estate of Marion Welsh, to transfer to S. and J. Welsh seventy-one shares of New England Watch Company stock, and the receivers were authorized to grant and record the transfer. The Chapman property is now for sale. M. Chapman has since been employed in one of the plants of the American Brass Company.

There is hope still that the New England Watch Company will get on its feet and make headway. There is much sentiment about it too, outside of those financially interested, as it is still recalled as the birthplace of the famous Waterbury watches which put Waterbury into all international gazeteers. Its prospects for forging ahead are considered good if the management can hold the reliable members of its present force. Much interest is taken in the discussions of the company's prospects and the reopening will be watched carefully for signs of future developments.

One of the important steps taken during the past month was made by the Chase Corporation. Little has been said about this, but there was a meeting, May 26, at which the directors voted to change the name of the corporation to "Chase Metal Works, Inc." Announcement to that effect has been officially made and papers filed with the Secretary of State. It is understood that this company will assume charge of the tube mills being completed in Waterville and operate them. The Chase Corporation had secured much of the land around and north of the property on which the mills stand and its stock is held by the same persons who are predominant in the affairs of the Chase Rolling Mills Company and the Waterbury Manufacturing Company.

While the month of May is always one of labor troubles, Waterbury has had comparatively little disturbance. The city has had none, although in one or two factories there has been an annoying discussion or two. Only one strike here assumed any size. That was called by the union painters and paperhangers of the city, but after several weeks it has been adjusted. It did not affect the shops. In one of the plants of the American Brass Company there was a disturbance early in spring caused by the refusal of a number of casters' helpers to work without an increase in pay. The affair was amicably adjusted as soon as the attention of higher authorities was brought to it and most of the men resumed work promptly. A number of yard men were reported to have quit work in the Benedict & Burnham plant of the American Brass Company a few days ago, but the foreman reported that there had been no demand on him for an advance in wages, as was claimed. That matter also has been adjusted. There have been some slight disturbances in Torrington, but throughout the Naugatuck Valley as a whole there is no evidence of serious dissatisfaction between employers and employed.

Business has continued prosperous in practically all branches of the metal industries throughout this section. There have been no pauses, except for the single holiday, or the week end following Memorial Day, in most plants. The fire which visited Seymour recently, causing the shutdown of the plant of the Seymour Manufacturing Company, is the only marked cloud on the sky of industrial prosperity. Anxiety over the tariff has not been noticeable, although the interest in progress in congressional discussions has not abated a jot. Generally speaking, the outlook is bright in industries hereabouts and what building is being done is being pushed forward as rapidly as possible. The Waterbury Castings Company, whose plant was damaged about $5,000 by fire early in the morning of April 27, has practically recovered its normal stride.

Much interest is being taken by the manufacturers in the new Chamber of Commerce and practically all the larger corporations are represented. At one of its recent sessions John P. Elton, formerly mayor of this city; Frederick S. Chase, D. L. Summey, Archer J. Smith, representing the industrial interests, were speakers on the topic of municipal reform. The Chamber of Commerce membership now is about 500 and enthusiasm never was higher.—F. B. F.

PROVIDENCE, R. I.

MAY 31, 1913.

There has been a marked improvement in the general tone of business conditions here during the past month. The inclination toward pessimism that was beginning to manifest itself has entirely worked away and in its stead there is a growing spirit of optimism that comes only of positive assurance of a healthy business prosperity. Providence, up to the present time, has been remarkably fortunate as regards labor disturbances in any line of business. In more than a quarter of a century, aside from a few incipient strikes there have been only two serious textile disturbances and one among the employees of the electric street cars. In the metal line strikes have been few and far between and when they have come they have only affected a single firm at a time and small numbers of employees. It has been many months since anything serious has occurred in the metal lines. Strange as it may appear, notwithstanding that upwards of 15,000 persons in this city alone are dependent upon the manufacturing jewelry industry and its allied and kindred trades, there is no labor organization of consequence. Several attempts have been made to unionize the industry, but without success. Recently another attempt has been made and about a fortnight ago five delegates from the new union were admitted to seats in the Providence Central Union.

At the American Enamel Works about 125 Armenians and Turks employed in the dipping department left the works on Wednesday last demanding an increase of 10 per cent. in the wages of all employees who are now receiving $10 a week or more and an advance of 15 per cent. to all whose pay is less than $10 per week. The matter has been taken under advisement by the officials of the company and an amicable settlement is anticipated. At the D. &. W. Fuse Company a slight disturbance was occasioned early in the month by the walking out of about twenty of the girls who desired more pay and a return to the previous method of handling machines. A settlement was satisfactorily adjusted.

With the provisions of the proposed revised tariff under consideration by Congress, a decision of great importance to the manufacturing jewelry industry was handed down early in the month by the Court of Customs Appeals, which is the court of final appeal in tariff cases, favorable to the American manufacturers of jewelry. In a statement issued by Manager Woodward Booth, of the New England Manufacturing Jewelers' and Silversmiths' Association, he says:

"On appeal of the government from decisions of the Board of General Appraisers made over a year ago, the court decides that gold-plated lace pins, valued at less than twenty cents per dozen, are not dutiable at 45 per cent. under the metal schedule, as articles not specially provided for, as declared by the board. The court, in reversing the board's decision, declares that lace pins and also gold-plated brass brooches and gold-plated brass neck chains are jewelry and therefore dutiable as such at 60 per cent., under the last clause of the jewelry paragraph, which reads: 'All articles commonly or commercially known as jewelry, 60 per centum ad valorem.'"

It will be of interest to the cornice trade, sheet metal and tinsmith workers and buyers of sheet metal in general to learn of the opening of a metal store by the New England Sheet & Tin Plate Company at 10 Smith street, this city, where a full line of black and galvanized sheets, roofing tin, bright tin, copper, solder and everything in connection with this line of business will be carried in stock. The Providence Co-operative Sheet Metal Company was awarded the contract for repairing the roof of the old Federal building on Weybosset street, this city, the job taking about a fortnight.

George B. W. Chambers, formerly employed in the graduating department of the Brown & Sharpe Manufacturing Company, for many years, has accepted the appointment of assistant superintendent with Landers, Frary & Clarke, manufacturers of hardware, silver and steel cutlery at New Britain, Conn. Articles were recently filed with the Secretary of State, J. Fred Parker, under the laws of Rhode Island, incorporating the Lamb & Dyell Refining Company, of Providence, with a capital stock of $50,000. The incorporators are Clarence J. Lamb, Harry J. Dyell and Sumner G. Rand.

Harry Cutler (chairman), Woodward Booth (secretary), Harry M. Mays, John M. Buffington, Charles T. Paye and Maurice J. Baer, as a committee of the New England Manufacturing Jewelers' and Silversmiths' Association, organized a few days ago to consider proposed changes in the United States national stamping law. This committee was appointed by President Harry M. Mays, to render special service in looking into any changes suggested in the stamping law that will tend to prejudice the interests of manufacturing jewelers and silversmiths, as the act is one of the most important affecting the trade. The special committee will hold meetings as the occasion requires and carefully scrutinize any attempts to change the laws, with the idea of opposing legislation at Washington unfavorable to the jewelry and silversmithing industries.—W. H. M.

ATTLEBORO, MASS.

MAY 31, 1913.

The month of June opens with the jewelry trade seeing a good fall ahead. The invasion of the jewelry buyers into Providence did not result in large orders, but salesmen on the road are not finding the trade over-cautious. The jewelry tariff, as it now stands, is not regarded as a severe blow at the industry. Business in the shops is about normal for this time of year. May brought no labor troubles of moment to the town. The painters started early with a demand for more pay and shorter hours, but the trouble was adjusted by the granting of a Saturday half holiday. Outside of the building trades, the town is not organized and has never shown signs that it wants to be.

H. E. Barton has finished a tubing machine after four years' work and it has been sold to a firm in Germany. The Oscar Hornig Company has been dissolved and S. Avard Rosene and Patrick W. O'Connell of that firm have organized under the name of S. A. Rosene Company. Straker & Freeman have purchased the firm formerly conducted by F. H. Cutler & Company. The D. A. Hart Company and Robert Earle Manufacturing Company have been consolidated as the D. A. Hart Company. Sturdy Bros., of Chartley, have purchased the pearl shop of Joseph Bloom, of this town. North Attleboro is interested in the prospect of a new $100,000 jewelry firm. Already $20,000 has been pledged toward the project.—C. C. C.

BOSTON, MASS.

MAY 31, 1913.

An organization of the Master Brass Finishers, Nickel Platers and Chandelier Workers of Boston and vicinity, under that designation, was formed May 26, a meeting being held in the United States Hotel, at which plans were made for co-operation in matters of mutual interest, also for a broader acquaintanceship among members of the trades represented. The participants included: F. N. McIntire and Charles W. Young, from the F. N. McIntire establishment; F. M. Carroll, of Carroll Bros.; William Bunting, for the Appleton Brass Works; A. M. Wiggin, H. Strater & Sons; F. L. Smith, Boston Finishing Company; Charles S. Taylor and Mr. Campbell, Boston Nickel Plating Company; C. P. Coggleshaw, Hodgdon Brass Works; E. P. Jones and H. M. Richards, Jones-Bertsch Company; W. P. Marble, W. P. Marble & Co.; W. C. Edson, W. C. Edson & Co.; D. Gorman, F. W. Webb Manufacturing Company; J. J. Devereux, Barrett Manufacturing Company; C. M. Martin, McKenney & Waterbury; Mr. Shaw, Cambridge Plating Company; Mr. Hennessey, Hennessey Brass Works; F. M. Callahan; E. H. Tarbell, E. H. Tarbell Company. The following officers were chosen: President, W. C. Edson; vice-president, J. J. Devereux; secretary-treasurer, C. W. Young, 167 Oliver street.

The workmen of Henry Strater & Sons, of Sudbury street, who have been holding out for a 48-hour week and increased pay, have returned to work, agreeing that the matters in dispute shall be settled by arbitration.

The United Silver Plate Company, Boston, has been incorporated under the laws of Massachusetts, with $20,000 capital, by Norman J. McGaffin and George R. Williams.

Somers, Hoeckel & Son, of the Washington building, Boston, gold and silver platers and jewelry manufacturers, have incorporated in Massachusetts, with $10,000 capital.

Employees of the Sturtevant Blower Works Company and Becker Milling Machine Company, in the Hyde Park district of Boston, both of which companies are controlled by Gov. Eugene N. Foss, went out on a strike May 29. The unions ask for 20 per cent. increase in wages and consideration of a Saturday half-holiday proposition. There are about 1,900 out. James O'Connell, president of the Metal Trades Department of the A. F. of L., came on from Washington and addressed the strikers at a mass meeting held by them in the local opera house Thursday afternoon.—J. S. B.

NEW BRITAIN, CONN.

MAY 31, 1913.

The industrial situation in New Britain at present is one of great uncertainty. The anticipation of the resignation of President Charles M. Jarvis, of the American Hardware corporation, a $12,000,000 concern, has caused the stock to drop and the vague rumors concerning the above action shroud the affair in still greater mystery. At a meeting of the directors held last week it was announced that Jarvis' resignation would probably be handed in by June 3.

Charles F. Smith, president of Landers, Frary & Clark, cutlery manufacturers, has been elected first vice-president of the American Hardware corporation, as successor to the late Charles H. Parsons, and C. A. Earl, manager of the screw division of the

corporation, and Charles B. Parsons, son of the late first vice-president and present manager of the P. & F. Corbin division, have been elected vice-presidents.

The I. W. W. have invaded New Britain! In a two days' campaign they secured a membership of about 200 with more considering their enrollment. Most of the members of the organization are Lithuanian and Polish laborers and moulders and their leaders state that there is no fear of a strike being called at present. They will peacefully ask for more money and less hours and then if their requests are not met with they threaten striking.

A falling off in the metal industry because of the proposed tariff changes has not been noticed as yet, but that the local manufacturers will be injured is conceded. In a speech here recently the Hon. Ebenezer J. Hill mentioned the tariff as affecting this city and said: "There will not be much competition in builder's hardware for a year. This will be because it will take that length of time for foreign manufacturers to get the American styles and designs. But they have four years to do it." Quoting statistics on local industries the former congressman said the reductions on a few New Britain made goods are:

"Corbin Cabinet Lock products, from 45 to 25 per cent.; P. & F. Corbin products, from 45 to 25 per cent.; Corbin Screw products, from 56 to 25 per cent.; Humason & Beckley products, from 77 to 40 per cent.; Landers, Frary & Clark products, from 41 to 27 and 47 to 25 per cent.; Malleable Iron castings, 28 to 10 per cent."

In an interview given to a METAL INDUSTRY man Seymour Robinson, treasurer of the Berlin Construction company, one of the largest structural steel concerns in New England, said that he felt no worry over the new tariffs. Pressed for an answer as to whether or not they would be detrimental to his concern he said, "We don't know and can't tell, but cannot see just at present how the proposed tariffs will affect our business materially."

As an aftermath to the above statement, President Sage, of the same concern, told THE METAL INDUSTRY correspondent a few days ago that the Berlin Construction company has additions under way which will "increase the shop by fifty per cent." At present the business at this plant was never more brisk and in order to facilitate the handling of orders many new machines are being installed.

Nothing further has been done regarding the moving of the Stanley Rule & Level factory to Germany, and all of the other metal concerns about the city seem to be running about the same as usual. Yet the officials all seem to be taking a gloomy view of the future and instead of making radical prophecies content themselves with saying "Well, wait and see, in a few months' time—." To date, however, conditions have not slackened in the least and business appears as brisk as ever.

THE RETIREMENT OF CHARLES M. JARVIS.

One of the biggest sensations sprung in Connecticut industries in a long time has been occasioned by the announcement that Colonel Charles M. Jarvis, president of the American Hardware corporation, New Britain, Conn., is to resign his position. The conditions under which this resignation is expected are also of an extraordinary nature. Having been reported critically ill for several weeks the rumor became current that President Jarvis had resigned by request. The directors of the corporation held a meeting on May 27, but his resignation was not received and they adjourned until the first Tuesday in June, giving out word that by then his resignation will likely be handed in.

Friends and opponents of President Jarvis take opposite views regarding the manner in which he conducted the affairs of the $12,000,000 concern. His foes take the stand that he has been unduly expensive. President Jarvis himself declines to be interviewed, but a friend of his states that he has made many enemies in the corporation through his endeavors to rid it of "barnacles." The president has discharged employees in the New York offices and elsewhere with the explanation that they are not needed under the merger, and as they were hired by constituent companies their opposition has become strong enough to cause his removal from office. His enemies, however, say that Mr. Jarvis has conducted the business in an extravagant manner. They charge him with expending money lavishly and with disregard for the more conservative policies of the combining firms before the corporation was formed.

The board of directors of the American Hardware corporation is made up of men well known in the metal industry world. They are C. H. Baldwin, Charles Glover, B. A. Hawley, C. M. Jarvis, C. F. Smith, A. J. Sloper, New Britain; S. C. Dunham, C. L. Robinson, Hartford; Charles Miller, J. S. Elton, H. H. Peck, Waterbury; F. P. Wilcox, New York; Rollin S. Woodruff, New Haven. Of these directors it is understood that Messrs. Dunham and Robinson, of Hartford, are strong supporters of President Jarvis.

Since the indisposition of President Jarvis the management of the corporation has fallen to first vice-president Charles F. Smith and it is reported that his methods are much stricter than formerly. He insists that each official shall be held strictly accountable and plays no favorites. According to reports the only ones who get a "pull" are those who "deliver the goods." About the factories it is understood that acting president Smith has given certain officials notice that they must give their undivided attention to factory business and must have no side lines. One official has been told he could either give up his position or his automobile agency and so on down the line. Other officers who have been rather independent about the hours they spent in their offices are now having to be on hand regularly. A very wholesome spirit is breathing through the entire corporation. Mr. Smith is a human dynamo; he knows what he wants and is determined to get it and as long as an employee gives his best efforts he has nothing to fear under the vice-president's regime. He enjoys the confidence of every man in the factory and they know he will give them a square deal.—H. R. J.

Later, June 3.—At a meeting of the board of directors of the American Hardware corporation, held here on June 3, the resignation of President C. M. Jarvis was accepted and Henry C. M. Thomson, of New York, was elected as his successor. In accepting Mr. Jarvis' resignation the following measure was passed: "Resolved, that a resolution be drafted expressing the esteem in which Mr. Jarvis is held by the board of directors." Messrs. Dunham and C. F. Smith were appointed a committee to draw up the resolutions. The new president will assume his duties on July 1, and until then First Vice-President C. F. Smith will be in charge of the corporation. President Thomson is the treasurer and financial manager of Hoggson Brothers, of New York.—H. R. J.

WASHINGTON, D. C.

MAY 31, 1913.

Another link in the tariff chain is being forged in the Senate. The process, however, bids fair to be a slow one. The sub-committees of the Finance Committee have just finished their hearings of the various schedules assigned to them, leaving a number of representatives of the various to be heard. All of these, however, will be given the opportunity to file briefs; and as a matter of business expediency, the latter course will perhaps accomplish as much as if the hearings had been extended. It is the hope of Chairman Simmons that the sub-committees will be ready to report to the full majority membership of the Finance Committee within a week. It is claimed that the Tariff bill as finally reported to the Senate will be a more "scientific measure," and that the rates will be equalized. In view of the fact that the bill will probably not be laid before the entire majority membership until after the 1st of June, and that the full membership of the committee will be called upon to settle a number of vexed questions, after which the bill must go to Democratic caucus, it is not believed that it will be reported to the Senate before the middle of June.

Producers of lead and zinc are naturally alarmed by the outlook, which, to say the least, is not the most encouraging, under contemplated legislation. Despite their emphatic protests against proposed reductions, drastic cuts have been incorporated in the Underwood bill. Metallic lead, which now carries a duty of 2⅛ cents a pound, will have a 25 per cent. ad valorem duty, while the rate on lead in ore is to be reduced from 1½ cents to ½ cent a pound. Metallic zinc is to be reduced from 1⅜ cents a pound to a 10 per cent. ad valorem basis. The duty on zinc in ore is now 1 cent when the metallic content equals or exceeds 25 per cent. The rate on a 20 to 25 per cent. metallic content is ½

cent a pound, and below that ¼ cent a pound. The proposed duty is 10 per cent. on the value of the content metal. Among other mineral schedules, it is proposed to place iron ore, coal and coke, sulphur and sulphuric acid on the free list. The aluminum duty is to be reduced from 7 cents a pound to 25 per cent. ad valorem, and the duty on antimony from 1 cent a pound to 10 per cent on the value.—J. J. M.

ALLENTOWN, PA.

MAY 31, 1913.

Allentown is a very progressive Pennsylvania Dutch community. The various industries are quite busy and the city is growing. Situated on the mountain top, having very good railroad facilities and the active go ahead idea of its citizens, there is no doubt as to its future. The Royal Chandelier works do considerable work for the department stores. They have secured the services of Max Shuck, of Philadelphia, to take charge of the metal spinning and chandelier work.

C. Spangler is quite busy on brass automobile casting work. C. H. Moseback, of 1136 Court street, has made a model of an aluminum mine door, which has been patented by Nicola Jaccho, of 617 Ridge avenue. The door can be made of any material. It is said to fill a long felt want in coal mines, so as to render life safe and rescue possible.

L. F. Grammes & Son have a very complete factory for the making of brass, gold and silver watch fobs, and have a good plating plant. Are also jobbing jewelry and novelties. Are handling steel balls for burnishing purposes. Have goods made to order in large amounts in Providence and Attleboro in the East. The Vulcan Brass Works, R. Meisterknecht, proprietor, has good facilities in the way of a metal pattern shop, brass foundry, machine shop and electro-plating and polishing department. This firm have been successfully established for fifteen years. Their main specialties are plain and ornamental brass trimmings for clock cases and special furniture, also experimental work from start to finish.

Frederick Job, of Wilkes-Barre, Pa., jewelry manufacturer, has erected a new building to be used as a factory and is putting in more machinery. He expects to enlarge the business considerably.

The Wyoming Cutlery Company are manufacturing table cutlery. They used to do silver plating, but that has been discontinued. After an absence of seven years, S. B. Austin has come back to assume the management of the factory, which is located at Wilkes-Barre, Pa.—H. S.

SCRANTON, PA.

MAY 31, 1913.

Scranton is a live city of 130,000 population and is the metropolitan district of the coal mining regions. The industries here are in fairly good condition, although there are generally several strikes which affect business some. The mine cave-in question has to be settled and it is the paramount issue of today.

The Eureka Plating Works, of 410 Linden street, are going out of business. The Everhart Brass Works, of Penn avenue, established in 1857, are making brass goods for water, steam and mine and mill supply lines, also manufacture Babbitt metal and handle sheet brass rod and tubing. The Alexander Brass Company, of Penn avenue, handle all kinds of metal, especially yellow. They expect to put in a smelting plant and furnaces to smelt white and Babbitt metal, lead, etc. Hughes Bros. have a brass, bronze and aluminum foundry and are busy making safety mine lamps.

The American Safety Lamp & Mine Supply Company have a large brass and iron foundry and work the finest grades of brass, bronze and aluminum. They are using the Farwell squeezer. A new brass foundry was built and the old one is now used for an iron foundry, making castings from one ounce to five pounds. The machine shop will also be enlarged. They are putting in a Jones & Lampson flat turret lathe and will put in more Farwell squeezers. The new addition will be 50 x 70 feet in size, of reinforced concrete construction. The company is manufacturing an automatic alarm to hang on cars to warn people off the track and a specialty of graphite lubricators for railroad locomotives. They will build 5,000 of the latter this year.

This company is also considering the erection of a new building for factory purposes and, when they do, will put in a plating plant. They have a force of thirty-five men at work. F. H. Stair and J. N. Douglass are the proprietors. Louis Klarstein succeeded Mazia & Klarstein in the manufacturing jewelry and plating business, 321 Lackawanna avenue. A. Mazia has taken a position with the Bee Hive Jewelry Company.

COLUMBUS, OHIO

MAY 31, 1913.

The metal market in Columbus has been holding pretty firm recently with the exception of zinc smelter which is weak, in sympathy with quotations all over the country. Other metals are holding their own and although the demand is not big, it is fairly steady. Metal using concerns in Columbus and central Ohio are in the market for small orders, although their disposition appears to be to buy only for immediate needs. Concerns making auto lamps are probably the best customers of the jobbing houses at this time. The flood had a bad effect on trade generally, although business is slowly recovering and it will be about normal soon. Aluminum casting is quoted at about 23 cents to the trade which is the same as the previous month. There is no especial change in brass and No. 1 red is sold at about 13¾ cents. Copper is also rather firm and is sold at 15 cents to the trade. Babbitt is moving well and other metals are unchanged.—J. W. L.

LOUISVILLE, KENTUCKY

MAY 31, 1913.

Prices for sheet copper and rod brass on the local market are firm, and the demand is fairly active, considering the fact that the manufacturers of distillers' supplies, who constitute the largest consuming factor on the first-named item, are practically out of the market at this time. The distilling plants are still running full blast, practically none of them having closed down as yet, and until the manufacturing season is ended there will be little work for the supply man in this line, save for occasional emergency repairs. Other factors of the market show about the usual demand, and indications are for continued good business in all lines.

The fact that an automobile lamp is one of the accessories of said vehicle subjected to the most wear and tear as the car is operated year in and year out has been turned to excellent advantage by the C. A. Stege Manufacturing Company, of Louisville, a concern which advertises its specialty of plating with brass or nickel, oxidizing or repairing all such equipment.

Louisville has already felt the effects of the impending new tariff, and of the unrest resulting from it in the business world, in the shape of an announcement from President Theodore Ahrens, of the Standard Sanitary Manufacturing Company, whose Louisville plant is the largest consumer in the city of big copper, to the effect that the company will for the present postpone building its proposed new warehouse. President Ahrens stated that the reason for this is that in the present condition of business, and the possibility of depression following the enactment of a new national revenue measure, the company felt that it would be unwise to make the investment required for the erection of the eight-story warehouse which it had made plans to build.

Henry M. Reed, who has been for the past two years manager of the Louisville plant of the Standard Sanitary Manufacturing Company, has been promoted by the company to the position of assistant general manager of all of the plants controlled by the company, with headquarters at Pittsburgh, where he formerly lived. Theodore Mueller, the present assistant manager, succeeds Mr. Reed as local manager. The employees of the Louisville plant, 2,500 in number, presented Mr. Reed with a colonial clock and a leather arm-chair as tokens of their regard for the departing officer. The plants which he is assisting in supervising from Pittsburgh include Louisville, New Brighton, Pa., Pittsburgh, Pa., and Toronto, Canada. Mr. Reed has been connected with the company for fifteen years.

CHICAGO, ILL.

MAY 31, 1913.

Chicago, the great industrial center of the west, is spreading out and has a population of over two and half million. Business in all lines of the brass and non-ferrous metals for the past four and one-half months has been beyond expectations, and several of the leading brass manufacturers in various lines are having plans made for increasing their plants. The business outlook is on the whole very good and the general tone is optimistic, and the present tariff bill up before Congress at this time has not affected the trade to any extent, so there is no reason for a gloomy view of trade conditions. There are some bills pending in the State Ligislature at present which will effect the brass manufacturers of Illinois; the eight-hour law for women employed in factories and stores, also some new amendments to the Employers' Liability and Compensation Act which went into effect a year ago.

Plumbing supply and lamp manufacturers especially state that business is good and collections the same, and the general tone is decidedly optimistic. President Brown, of the Chicago Faucet Company, located at 315 South Clinton street, Chicago, manufacturers of self-closing faucets and bubbling drinking fountains, are running to their full capacity and are adding a new line of basin and bath cocks named the Quaturn faucets or Quick-pression.

Secretary Frank McNellis, of the Imperial Brass Manufacturing Company, Centre avenue and Harrison street, Chicago, reports business was never better, and the outlook for this year promising. They are now established in their new four-story factory building and make a full line of automobile and brass supplies and specialties. They also manufacture car trimmings for the pullman company, the plant has been running overtime three nights per week to keep up with their orders.

C. S. Johnson, president and treasurer of The Northern Brass Manufacturing Company, Waukegan, a suburb of Chicago, is very enthusiastic over the business situation this year, as he reports their output is 15 per cent. ahead of last year, and it was one of the best they ever experieenced. They make a specialty of bath and basin cocks only, and their output was two hundred and fifty thousand of these last year, and they expect to go over the three hundred thousand mark easily this year. They have just finished an addition to their plant.

President Fowler, of the Fowler Lamp Manufacturing Company, 61 East Twenty-fourth street, Chicago, reports business exceedingly good and running to their full capacity. The Wolf Manuafacturing Company, one of the largest manufacturers of plumbing brass goods, reports business good for the past six weeks. Owing to weather conditions the season was late in opening, as building was retarded.

President Adolph Mueller, of the H. Mueller Manufacturing Company, Decatur, Illinois, is quite optimistic over the business outlook for this year, and reports business ahead of last year at this time, which was one of the banner years of their company. He claims the tariff bill now pending will not effect business to any great extent and will adjust itself in a short time, and predicts that this will be one of the best business years in their career. They have shipped some large orders to the Northwest and Pacific coast within the past ten days for gas and water works brass goods.

The Co-operative Polishing and Plating Company, one of the large jobbing shops in this city employing a large force, reports business this year ahead of the previous. I paid a visit to three of the leading polishing and platting supply houses, and they report business ahead of any other year. Vice-President O'Connell, of the Bennet O'Connell Company, located at 3600 South Morgan street, reports business was never better for their company at this time of the year, and there is quite a demand for their product. A manager of one of the leading supply houses located on Clinton street, who would not allow me to use his name, reports a falling off in business within the past thirty days and ascribes same to the manufacturers holding off in the purchase of supplies until the tariff bill is fully settled in Congress. They are receiving as many orders, but the only thing is the manufacturers are curtailing same and buying only enough to carry them for a short period. He is quite optimistic over the situation and expects within the next sixty days to be unable to fill orders owing to the demand. The president of the above company was here from the home office in the East ten days ago, and the matter of acquiring a building of their own, either through purchase or erecting same, was under discussion, and it was decided to lay the matter over until fall and take same up then.

Manager Joseph Terreaw, of the E. Reed Burns, of Brooklyn, N. Y., whose Chicago factory is located at 162 North Desplaines street, reports a heavy demand for supplies at this time of the year, and making heavy shipments of their buffs and belt wheels, also Tripole polishing compound, of which this company is making a name for itself in the Middle West, as they have a large demand for their goods. He reports business outside of Chicago in the Middle West as above the average and predicts this to be the banner year of the concern he has so ably represented for the past nine years.

As architectural bronze work is used to a large extent in office and bank buildings in Chicago, and there is quite a number of these buildings in course of construction at present, the Winslow Bros. Company, located in the 4600 Block West Harrison avenue, are fully employed. The Heath & Johnson Company, of Ontario street, are running to their full limit. The splendid condition of business is keeping all plants running to their full capacity. Orders on hand will carry them along for two months, and the tariff bill is not going to effect business to any great extent, and the prosperity of Chicago and surrounding territory never looked brighter than at the present time.—P. W. B.

DETROIT, MICHIGAN

MAY 31, 1913.

Detroit for the last few years has enjoyed unusual freedom from labor troubles. The last two years particularly have been free from serious disturbance. Within the last month, however, a few clouds have appeared in the labor world, but by skillful management all difficulties have been avoided. The first to attract attention was during the early spring weeks when a small strike among the machinists at the Burroughs Adding Machine Company caused some anxiety, but this dispute has been settled and everything is running smoothly at this plant in the north end of the city. The second forerunner of trouble made its appearance when several members of the Industrial Workers of the World attempted to organize the 16,000 workmen at the Ford Motor Car Company in Highland Park. These disturbers first appeared during the noon hour about three weeks ago. The speakers attempted to hold great mass meetings in front of the Ford factory. They appeared before the police had any intimation as to what was doing. The president of Highland Park council immediately called into service a large number of police and ordered the speakers off the streets. They protested and on the first day many of the workmen seemed to resent the interference. The speakers appealed to the workmen, but the police were firm and the speakers were arrested. All were fined, including one woman, and since then no further trouble has been experienced.

Detroit has been, for some time, free from serious labor troubles. This fact alone has been largely instrumental in inducing many manufacturing concerns to locate here. The recent troubles due to insufficient transportation facilities have been entirely overcome, and the city never was in such a prosperous condition as it is today. Brass and aluminum plants, motor car factories, in fact every industry in the city, is operating full handed.

The Ford Motor Car Company has begun new work on buildings that, when completed, will nearly double the capacity of the plant. All the other standard automobile concerns in the city are operating to full capacity, although some of the smaller concerns are not doing as well as they had anticipated. Accessory plants that manufacture automobile parts from aluminum and brass are continuing at highwater mark. The outlook for the summer in every line of brass and aluminum trade is good.—F. J. H.

NEWS OF THE METAL INDUSTRY GATHERED FROM SCATTERED SOURCES

The C. F. Church Manufacturing Company, Holyoke, Mass., manufacturers of plumbing specialties will build a factory at Willimansett, Mass., 40 x 225 ft., one story.

The item published in the May number of THE METAL INDUSTRY stating that the Ingersoll-Trenton Watch Company, Trenton, N. Y., had installed a Tolhurst Centrifugal Dryer was an error. The concern intended was the Elgin Watch Works, of Elgin, Ill.

Plans are being considered by the Traut & Hine Manufacturing Company, manufacturers of hardware specialties, New Britain, Conn., for the construction of an addition to its plating department to increase the capacity one-third.

The published report that the Westinghouse Electric & Manufacturing Company, of Pittsburgh, Pa., intended to build a branch factory at St. Louis is stated to be an error by the company, per J C. McQuiston.

The Chase Rolling Mill Company is planning the construction of another building at its factory on Thomaston avenue, Waterbury, Conn. The structure will be of brick and steel 60 x 180. This is part of the new Chase Mills now partly under construction at Waterville and partly in operation.

The Detroit Platers' Supply Company, 310 Hammond building, Detroit, Mich., has been formed to continue the business of D. B. Moyer, manufacturer of platers' supplies, to which it succeeds. D. W. Moyer is secretary and manager, and F. W. Page is president and treasurer of the new company.

The Wellsville Electric Plating Works, Wellsville, N. Y., announce that they are now fully equipped and ready to do all kinds of electric plating work in gold, silver, nickel, copper, bronze and white metals and that they are able to guarantee all of their products to be first class in every respect. This firm is composed of G. W. Manning and T. S. Mills, who have had very extensive experience in electro-plating business.

The firm of Hartley, Spalckhaver & Fay, New York representatives for the Bates & Peard Annealing Furnace, announces that the business heretofore conducted by them will be carried on by H. A. Astlett & Company, 117 Pearl street, New York. John Spalckhaver and Frederick A. Fay have associated themselves with H. A. Astlett & Company and will give their personal attention to the further development and extension of the business.

As the result of negotiations between the General Bakelite Company and the Damard Lacquer Company of America, the latter company has acknowledged the validity of the Bakelite patents in question, and will pay substantial royalties thereunder. The General Bakelite Company will continue the manufacture of Bakelite Lacquer under its several patents and the Damard Lacquer Company will manufacture Damard Lacquer under the license just granted to it by the General Bakelite Company.

Leiman Brothers, 62-j John street, New York, have taken an additional loft at the present location of their New York store and will use it as a show room for demonstrating purposes. They will have in operation a complete line of sand blasts, platers' and polishers' lathes, jewelers' rolls and apparatus for soldering, melting, brazing, etc. This firm will soon bring out a number of new and novel devices for the use of manufacturing jewelers and other metal workers.

Of interest, as showing the gradual development of small streams for the local use of power, is the hydroelectric plant which is being put in by the Andrew Terry Company, manufacturers of castings, Terryville, Conn. Use is made of an old dam across the Pequabuck River, the mill connected with which was burned down some time ago. This is located one-half mile below the present factory and has been made the location of a new plant operating under 36 foot head.

The annual exhibit of the work of day students of Pratt Institute, Brooklyn, N. Y., will be held as follows: Thursday, June 12, 2 p. m. to 5 p. m.; Friday, June 13, 10 a. m. to 5 p. m.; Saturday, June 14, 10 a. m. to 5 p. m.

This exhibit is open to the public and affords those who are interested in industrial and technical education an opportunity not only of viewing the work of students in the various courses, but also of inspecting the methods as well as the equipment of the school and its general facilities for conducting this kind of training.

The Monarch Engineering and Manufacturing Company, Baltimore, Md., advise that they have purchased from the Rockwell Furnace Company, of New York, bankrupt, all United States and foreign patent rights, patterns, drawings and blueprints relating to their full and complete line of melting furnaces of all kinds, including their well-known type of double chamber and simplex type of furnaces, burners, mint and muffle type, reverberatory, etc., and their full and complete line of portable heating equipments such as heaters for forge and rivet work, lead melting, annealing, hardening, skin drying, foundry cupolas, also pumps, blowers, soft metal equipment, etc.

The Gerline-Myers Brass Foundry Company, Kalamazoo, Mich., recently incorporated, advises that it is erecting a brick and steel building, 60 x 100 feet, and sheds 20 x 60 feet for sand, flasks, etc. The capital, $20,000, is all paid in. Samuel Franklin, proprietor of the Three Rivers Iron & Metal Company, Three Rivers, Mich., is president; Otto Gerline, for 13 years superintendent of the Three Rivers Brass Works, is vice-president and manager, and Samuel B. Myers, foreman for the Henderson-Ames Company's brass foundry at Kalamazoo, is secretary and treasurer. General jobbing in high grade brass, bronze and aluminum castings will be done. The concern is in the market for equipment and supplies. Address Otto Gerline, Box 141, Three Rivers, Michigan.

The good will, drawings, patterns and patents of the Rockwell Furnace Company have been purchased by the Quigley Furnace & Foundry Company, who will continue the manufacture of their full line of furnaces, with the exception of the melting furnaces, portable heaters, rivet forges, etc., which will be marketed by the Monarch Engineering & Manufacturing Company, Baltimore, Md., they having added the Rockwell melting line to their present line of furnaces. Orders for repair parts, etc., will be given prompt attention by these companies.

The works of the Quigley Furnace & Foundry Company are at Springfield, Mass., and their New York office is now at the Havemeyer Building, 26 Cortland street.

The Hill-Brunner Foundry Supply Company, of Cincinnati, Ohio, is comprised of Mr. John Hill, formerly president of another concern, and Mr. Fred J. Brunner, who needs no personal introduction to the trade, each having been identified with the foundry business and have a combined experience of over fifty years in this line. They have live wire connections in every department of their enterprise and are operating a very large, modern, up-to-date plant at Cincinnati as well as Chattanooga, Tenn., and have a branch warehouse at Birminghm, Ala.

This company will manufacture the highest grade of plumbagos, core compound, partings, core washes, sea coal facing, which their experience has enabled them to secure.

They likewise supply the trade with all kinds of foundry supplies and equipments suitable for outfitting a complete foundry of any kind.

The Munning-Loeb Company, of Matawan, N. J., announces that it has obtained the exclusive rights for the manufacture and sale of the "None-Such" single cylinder and double cylinder rotating plating barrel, covered by patents of S. D. Catlin and formerly sold by Rockhill & Vietor. These machines are now being manufactured at the plant of the Munning-Loeb Company, and several new features have been incorporated. The Munning-Loeb Company states that the

decision to manufacture the "None-Such" plating barrel was made only after an investigation of the different types on the market, which convinced it that the "None-Such" was the most efficient and practical barrel for plating small articles. The company has also acquired the sale and manufacturing rights of the "None-Such" carboy rocker. Both of these appliances are fully described in Catalogue 400, which will soon be ready for distribution.

FOREIGN BUSINESS OPPORTUNITIES

No. 10,866. Caustic soda.—An importing firm in the Levant would like to receive from American exporters quotations on caustic soda, used in the manufacture of soap. About 1,500 tons of the article are purchased yearly. An American consul states that lately the average price quoted by European dealers c. i. f. the port in question has been 20 francs per 100 kilos ($3.86 per 220 pounds). Correspondence should be in French and prices quoted c. i. f. port of destination. This is said to be an old established firm with an excellent commercial reputation.

No. 10,990. Copper, brass products, etc.—An American consular officer in Turkey reports that a local merchant, whose bank ratings may be had on application, is desirous of representing American manufacturers of the following articles who may be interested in bidding for supplies which will be put to adjudication during the course of the present year by a railroad company in that country: Copper pipes, bronze bars, copper bars, copper in ingots, brass wire, antifriction metal, copper, tin, lead, copper plates, copper wire and graphite. Large quantities of these supplies will be purchased, and specific details regarding any of them may be had by writing to the merchant in question. Correspondence may be in English.

REMOVALS

NEW HOME OF HERMANN GEHNRICH

Hermann Gehnrich, manufacturer of the Gehnrich Sectional Portable Ovens, announces his removal to his new building, 60 and 62 Franklin avenue, Brooklyn, N. Y. Since the establishment of this concern in 1880 they have been forced three times to move to larger quarters and due to the success and rapid growth of the business found it necessary to provide space for the handling of large contracts for ovens which they are continually building. The first order has just been completed in their new building and consists of a battery of three ovens each 9 feet wide, 14 feet deep and 7 feet 9 inches high. The ovens are of the indirect gas-heated radiator type and are to be used for drying lithographed tin plates which are placed on trucks and rolled into the oven. Each oven is fitted with three radiators, one on either side and one through the center, providing a perfect heating system and with the use of the ceiling fans the heat is circulated and distributed most evenly throughout the oven. This type of oven has proved most successful for baking the new acid-proof lacquer which requires an absolute temperature due to the fact that the lacquer is so sensitive that a variation of a few degrees of heat will discolor the work.

The building which was completed in February is of modern construction of brick and steel and has a floor area of 15,000 square feet. The walls are built to carry four additional stories to take care of further expansion of business. The rear of the building is built with an extension, size 46 feet x 60 feet, with large windows on two sides and three saw-tooth skylights each 36 feet long. This part of the plant is used for the assembling of ovens and is constructed without posts making it possible to set up a large battery of ovens complete. The upper floor is used, for draughting, pattern cutting and stock rooms and the material is carried on a large electric elevator. The front of the building is finished in hard burnt brick with raked joints and trimmed with white stone. The window frames are of steel construction glazed with ¼-inch clear wired glass and the entire surface can be opened for ventilation. The steam heating system throughout the entire building is overhead, free from obstruction and clear of all machinery. Care was taken in drawing the plans to provide ample room, light and ventilation for the employees, which helps to maintain the high standards of workmanship of their products and facilitates the handling of the work. Mr. Gehnrich is assisted in business by his three

HERMANN GEHNRICH'S NEW BUILDING.

sons who, besides being brought up in the business, are all graduates of trade schools.

On account of increased business, the Edward B. Gibford Company, of 58 North Main street, Adrian, Mich., manufacturers of universal razor strops and hardware novelties, will shortly remove to larger quarters, the factory formerly occupied by the Church Manufacturing Company, Church street and Wabash Railroad of that city.

The Hannifin Manufacturing Company, makers of air-operated chucking and labor-saving devices, announce the removal of their main office and works to their new building, 621-625 South 45th street, Chicago, Ill. In their new quarters they have the best of facilities for manufacturing their line of devices.

Dyer Smith has removed his law offices from 2 Rector street to the Woolworth Building, 233 Broadway, New York, where he has become associated with Louis Hicks, Esq.

The New York Buff Company, manufacturers of platers' and polishers' and grinders' supplies, have moved to 210-212 Canal street, New York.

L. E. Olney, electro-plater and colorer, formerly located at 50 Columbia street, Newark, N. J., has moved to larger quarters at 93 Lafayette street.

NEW FIRM

The Garrett-Tilley Company, Inc., 90 West street, New York, has been formed by F. S. Garrett and E. F. Tilley, and will devote its attention to the design and construction of accurate temperature furnaces for the heat treatment of metals. Mr. Garrett was formerly president of the Rockwell Furnace Company, while Mr. Tilley was head of the engineering department of the same company.

CHANGE IN FIRM

The Hydro Carbon Company, Wichita, Kansas, have changed their name to the Coleman Lamp Company.

The Gaynor & Mitchell Company, Bridgeport, Conn., have changed their name to the Gaynor Manufacturing Company, and have just moved into their new building.

FIRES

Fire visited the plant of the Lumen Bearing Company, Buffalo, N. Y., Sunday, May 11, destroying the coke and sand sheds and the wood buildings at the rear of the main foundry. While such of the buildings as were of wood construction were consumed the destruction was stopped by the concrete floors and roof of the pattern shop and the fire doors between it and the pattern storage building acting automatically. No damage was done to the foundry proper or patterns and the work of replacing the burned portion with fireproof buildings is already under way. No interruption to business was caused and all orders are being filled with the usual promptness.

The Knickerbocker Foundry Company of New York, N. Y., whose plant was recently destroyed by fire, announce that an up-to-date foundry has been erected for them at 82 Crescent street, Long Island City, N. Y. This company will be the sole occupants of the building which has been designed especially for the foundry business according to the most approved and modern ideas of construction. The equipment will be of the best and so arranged that orders can be gotten out promptly and the workmanship the very finest that can be produced. Louis Schanz is president and A. P. Chavent, vice-president and secretary, and the company will be ready to produce castings in gold, silver, bronze, etc., etc., after June 15th.

INCORPORATIONS

Haslup Brass Manufacturing Company, Inc., Brooklyn, N. Y. Capital, $25,000. To manufacture and deal in hardware and supplies. Incorporators: Edward W. Haslup, F. D. Glover and J. Scholl, all of Brooklyn.

The Wheeler Bros. Brass Foundry, Troy, N. Y. Capital stock, $15,000. To carry on a general brass foundry business. Incorporators: Joseph and Henry Wheeler and others, all of Troy.

Miller & Starr Company, Brooklyn, N. Y. Capital, $20,000. To manufacture brass, tin, iron and steel. Incorporators: William P. Miller and Henry B. Starr, of Brooklyn, and Clara E. Miller, of Freeport, L. I.

The George Taylor Brass & Bronze Works, Inc., New York. Capital, $10,000. Incorporators: G. F. Rubuar, J. A. Morand and George Taylor, all of New York.

Lindsey Metal Works, East Orange, N. J. Capital, $50,000. To manufacture metal novelties. Incorporators: H. P. Picking, C. O. Geyer and F. E. Ruggles, all of Newark.

Rosenband Manufacturing Company, Newark, N. J. Capital, $50,000. To manufacture metal goods. Incorporators: B. Einer, U. R. Weiner and A. Roseband, all of Newark.

The Monarch Aluminum Ware Company, Cleveland, Ohio, has been incorporated with a capital of $10,000 to manufacture aluminum ware. The incorporators are Raymond Deutsch and others.

The Metal Treating & Equipment Company, Inc., New York. Capital, $100,000. To manufacture solutions for cleaning, plating, etc. Incorporators: G. M. Secerdote, L. A. Freedman and L. E. Deneergaard, all of New York.

The Miller Jewelry Company, Cincinnati, Ohio, have increased their capital stock from $25,000 to $50,000.

The Union Specialty & Plating Company, of Cleveland, Ohio, has been incorporated with a capital stock of $20,000 by W. J. McNamara and others.

The Cleveland Electro-Metal Company, of Cleveland, Ohio, has been incorporated with a capital stock of $20,000 to refine, smelt and manufacture and deal in metal products. The incorporators are John W. Brown, Holly G. Wellman, Fred S. Wellman, Wendel C. Wilcox and Charles W. Hill.

The Forest City Plating and Manufacturing Company, of Cleveland, Ohio, has been incorporated with a capital stock of $10,000 to do polishing, electro-plating and manufacturing products of metal. The incorporators are H. M. Eisenberg, Samuel Forestek, Peter Lisowski, Henry Grunfeld and Joseph A. Keysela.

The Federal Metal Company, of Cleveland, Ohio, has been incorporated with a capital stock of $50,000 to do smelting, refining and to deal in all kinds of metals. The incorporators are Elias Nathan, Joseph Magusky, Abraham Lipkowitz, A. L. Dietz and Max P. Goodman.

The Monarch Aluminum Ware Company, of Cleveland, Ohio, has been incorporated with a capital stock of $10,000 to manufacture and deal in cast aluminum kitchen utensils. The incorporaters are Raymond Deutsch, Irwin W. Loeser, Nathan Loeser, Sidney N. Wertz and Harry Pett.

PRINTED MATTER

Punches and Shears.—A 40-page catalog, No. 90, has just been published by the Watson-Stillman Company, 50 Church street, New York. Many types of punches and shears are illustrated and fully tabulated. A few screw punches and power-driven machines are also shown, while nine pages are devoted to fittings and repair parts. A free copy will be mailed on request.

Molding Machines.—The Osborn Manufacturing Company, manufacturers of molding machinery, Cleveland, Ohio, have issued a very complete and up-to-date catalog No. 142, which covers a large line of molding machines and accessories used in the modern foundry. Among the machines described and illustrated in the catalog may be mentioned, the plain jolt and pattern drawing machines, direct-draw roll-over jolt molding and roll-over rock-down molding machines, rock-over drop-draft molding machines and the Osborn drop-plate flask-stripping molding machine. Copies of this catalog can be obtained on request.

Whitehead Brothers Company, 537 West 27th street, New York, who claim to be the pioneer producers of Albany and North River molding sand, have issued a catalog describing the various kinds of sands, clays, gravels, etc., produced by them, and giving useful information regarding the characteristics and quality, uses and sources of supply of their complete line, which includes special sands for use in brass and aluminum foundries and core rooms. They are also the largest importers of French sand and ship large quantities of Windsor Locks sand, fire clay, fire sand, etc. Brass and aluminum foundries will find their catalog, which is sent free, to contain a large amount of interesting information.

Plumbago Goods. The Joseph Dixon Crucible Company, Jersey City, N. J., have just published an attractive booklet of 30 pages devoted to a description and illustrations of plumbago stoppers, nozzles and sleeves. Although many illustrations of stoppers appear in this booklet, they do not by any means comprise the many styles and sizes, of which there are hundreds. This booklet is well worth the reading to those who are at present using clay instead of graphite stoppers.

Steam Turbines.—Of the velocity stage type are fully described in a small fifty page booklet just issued by the De Laval Steam Turbine Company, Trenton, N. J.

METAL MARKET REVIEW

NEW YORK, June 9, 1913.

COPPER.

There has hardly been a day during the month of May that dealers and outside interests have not been able to undersell the leading copper selling agents.

It is a great mistake that the producers of copper allow their product to be sold by a group of Wall Street operators.

The market was in fairly good shape early in the month and both home and foreign consumers were buying freely; there was already a slight slackening of trade generally all over the country, but these signs were totally ignored by the Wall Street selling agents and the price of copper was pushed up from 15½ towards the end of April to 15⅞ on May 10, the very day that the Steel Corporation monthly statement was published showing a falling off of nearly 500,000 tons in unfilled orders, and in face of that setback these selling agents were forcing up the price of copper. The market has never responded to the advance and today the market is weak and unsettled at half a cent a pound below the prices asked by the leading selling agents. Fifteen and a half cents is a big price for copper; consumers were willing to contract at this price and had confidence in the market, but when the price was forced up to ⅝, ¾ and then to ⅞, when business was falling off and every merchant in the country knew it, consumers generally held off, and today, while these selling agents are asking 15⅞, consumers can buy all the copper they need at half a cent a pound lower. They are not buying and the trouble is they do not need the copper; 15⅞ was an artificial price and the copper market never warranted it.

The exports for the month were heavy again, over 38,000 tons. The exports during the last three months amount to 113,953 tons, or over 255,250,000 pounds, and in face of these enormous exports we are told the European stocks of copper have decreased during that same period over ten million pounds. Of course, the trade here, and probably the trade abroad, has not any faith in these figures as representing consumption of the metal.

The market today is dull and unsettled, with positively no buying and no interest being shown by consumers. The leading selling agents are still asking 15⅞ while copper is freely offered for June, July and August delivery at half a cent a pound lower.

TIN.

Opening at around 50 cents a pound, tin got up to 50.75 and then the London market broke and closed at around 47¼ cents, and during the early days of this month the price dropped to below 46¾ cents.

The statistics show that the visible supply increased nearly 4,000 tons during the month.

The price is around 46¾ cents and July can be bought at close to 46 cents.

LEAD.

The market is weak and unsettled; the trust price is 4.35 New York and the independents are selling at the same figure; but there is very little doing.

SPELTER.

The market is weak again and looks like going to 5 cents in St. Louis. Consumers are holding off and producers seem to have an over-supply. Market today is 5.30 New York, 5.15 East St. Louis. Sheet zinc has been reduced 25 cents to 7.50 f. o. b. smelter.

ALUMINUM.

The market has been very unsettled, and from 26½ for ton lots early in April the price dropped to 25 cents and advanced later to 25½; smaller lots—98-99 per cent.—26 to 26½ cents.

ANTIMONY.

Prices are lower again in the antimony market and very little doing. Cookson's is quotable at 8¾ cents, Hallett's at 8¼ and Hungarian grade 7¾.

SILVER.

The silver market during the month has been fairly steady. Opening at 60 cents New York, price advanced to 61 and closed at around 60, with London quotable at 27¾d.

QUICKSILVER.

The wholesale price has been held steady at $40 per flask, with jobbing lots at $40.50 to $41.00.

PLATINUM.

Hardly any change in platinum. Hard is quotable at $51 per ounce, ordinary refined at $46 and iridium at $85 per ounce.

SHEET METALS.

The price of sheet copper and wire are unchanged. Sheet is quotable at 21 cents base and wire at 16½ cents base; high sheet brass at 15⅜ cents. The copper market is soft and it is possible these prices can be shaded.

OLD METALS.

The slump in copper in London has given the old metal market a decidedly soft appearance and any sales that are made have to be cut beyond any decline in the actual copper market. The market is very dull and Europe does not seem interested.—J. J. A.

MAY MOVEMENTS IN METALS

	Highest.	Lowest.	Average.
COPPER.			
Lake	15.85	15.60	15.75
Electrolytic	15.80	15.45	15.65
Casting	15.60	15.35	14.50
TIN	50.75	47.25	49.20
LEAD	4.50	4.35	4.40
SPELTER	5.60	5.30	5.50
ANTIMONY (Hallett's)	8.25	8.25	8.25
SILVER	61.00	59⅞	60.36

COPPER PRODUCTION

(Issued by the Copper Producers' Association.)

	June 9, 1913.
Stocks of marketable copper of all kinds on hand at all points in the United States, May 1, 1913	75,549,108
Production of marketable copper in the United States from all domestic and foreign sources during May, 1913	141,319,416
	216,868,524
Deliveries:	
For domestic consumption	81,108,321
For export	68,285,978
	149,394,299
Stocks of marketable copper of all kinds on hand at all points in the United States, June 1, 1913	67,474,225
Stocks decreased during the month of May	8,074,883

WATERBURY AVERAGE

The average price of Lake Copper per pound as determined monthly at Waterbury, Conn.

1912—Average for year, 16.70. 1913—January, 17; February, 15.50; March, 15⅛; April, 15.75; May, 15⅞.

DAILY METAL PRICES

We have made arrangements with the New York Metal Exchange by which we can furnish our readers with the Official Daily Market Report of the Exchange and a year's subscription to THE METAL INDUSTRY for the sum of $10. The price of the Report alone is $10. Sample copies furnished for the asking. We can furnish daily telegraphic reports of metal prices. Address THE METAL INDUSTRY, 99 John street, New York.

INQUIRIES AND OPPORTUNITIES

Under our directory of "Trade Wants" (published each month in the rear advertising pages), will be found a number of inquiries and opportunities which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds, assists in the buying and selling of metals, machinery, foundry and platers' supplies, procures positions and secures capable assistants. See Want Ad. pages.

Metal Prices, June 9, 1913

METAL PRICES.

	Price per lb. Cents.
COPPER—PIG AND INGOT AND OLD COPPER. Duty Free. Manufactured 2½c. per lb.	
Lake, carload lots	15.50
Electrolytic, carload lots	15.40
Casting, carload lots	15.25
TIN—Duty Free.	
Straits of Malacca, carload lots	47.00
LEAD—Duty Pig, Bars and Old, 2½c. per lb.; pipe and sheets, 2⅜c. per lb.	
Pig lead, carload lots	4.35
SPELTER—Duty 1⅜c. per lb. Sheets, 1⅝c. per lb.	
Western, carload lots	5.35
ALUMINUM—Duty Crude, 7c. per lb. Plates, sheets, bars. and rods, 11c. per lb.	
Small lots, f. o. b. factory	27.00
100 lb. lots, f. o. b. factory	26.00
Ton lots, f. o. b. factory	25.50
ANTIMONY—Duty 1½c. per lb.	
Cookson's cask lots, nominal	8.75
Hallett's cask lots	8.25
Hungarian grade	7.75
NICKEL—Duty Ingot, 6c. per lb. Sheet, strip and wire 35 per cent. ad valorem.	
Shot, Plaquettes, Ingots. Blocks according to quantity	40 to .45
ELECTROLYTIC—3 cents per pound extra.	
MANGANESE METAL—Duty 20 per cent	.90
MAGNESIUM METAL—Duty 3 cents per pound and 25 per cent. ad valorem (100 lb. lots)	$1.50
BISMUTH—Duty free	$2.00
CADMIUM—Duty free	.90
CHROMIUM METAL—Duty 25 per cent. ad valorem	.98
QUICKSILVER—Duty 7c. per lb	.56
	Price per oz.
GOLD—Duty free	$20.67
PLATINUM—Duty free	46.00
SILVER—Government Assay Bars—Duty free	.59¾

INGOT METALS.

	Price per lb. Cents.
Silicon Copper, 10% according to quantity	27 to 32
Silicon Copper, 20% " "	34 to 36
Silicon Copper, 30% guaranteed " "	36 to 38
Phosphor Copper, guaranteed 10% " "	24 to 28
Phosphor Copper, guaranteed 15% " "	25 to 29
Manganese Copper, 25% " "	25 to 29
Phosphor Tin, guaranteed 5% " "	61 to 63
Phosphor Tin, no guarantee " "	53 to 60
Brass Ingot, Yellow " "	10 to 11¼
Brass Ingot, Red " "	14 to 15¾
Bronze Ingot " "	13¾ to 14½
Manganese Bronze " "	18½ to 20
Phosphor Bronze " "	13 to 26
Casting Aluminum Alloys " "	26 to 28

PHOSPHORUS—Duty 18c. per lb.
According to quantity ..... 30 to 35

OLD METALS.

Dealers' Buying Prices. Cents per lb.		Dealers' Selling Prices. Cents per lb.
13.75 to 14.00	Heavy Cut Copper	15.00 to 15.25
13.50 to 13.75	Copper Wire	14.25 to 14.50
12.00 to 12.25	Light Copper	13.25 to 13.50
12.00 to 12.25	Heavy Mach. Comp	13.75 to 14.00
8.50 to 8.75	Heavy Brass	9.00 to 9.25
7.00 to 7.25	Light Brass	8.25 to 8.50
8.00 to 8.25	No. 1 Yellow Brass Turnings	9.00 to 9.25
11.00 to 11.50	No. 1 Comp. Turnings	11.50 to 12.50
3.75 to ——	Heavy Lead	—— to 4.25
5.50 to ——	Zinc Scrap	4.00 to 4.25
10.00 to 12.00	Scrap Aluminum Turnings	12.00 to 14.00
15.00 to 19.00	Scrap Aluminum, cast, alloyed	17.00 to 20.00
20.00 to 22.00	Scrap Aluminum, sheet (new)	20.00 to 21.00
23.00 to 24.00	No. 1 Pewter	25.00 to 26.00
20.00 to 23.00	Old Nickel	23.00 to 26.00

PRICES OF SHEET COPPER.

BASE PRICE, 21 Cents per Lb. Net.

Width.	LENGTH.	64 oz. and over.	32 oz. to 64 oz.	24 oz. up to 32 oz.	16 oz. up to 24 oz.	15 oz.	14 oz.	13 oz.	12 oz.	11 oz.
	SIZE OF SHEETS.	Extras in Cents per Pound for Sizes and Weights Other than Base.								
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	½	1	1½	2	2½
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	½	1	2	3	4½
	Longer than 96 inches. Not longer than 120 inches.	"	"	½	1	2	3	5	7	—
	Longer than 120 ins.	"	"	1	1½					
Wider than 30 ins. but not wider than 36 inches.	Not longer than 72 inches.	"	"	Base	Base	1	2	3	4	6
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	2	4	6	8
	Longer than 96 inches. Not longer than 120 inches.	"	"	1	2	3	4			—
	Longer than 120 inches.	"	1	2	3					—
Wider than 36 ins. but not wider than 48 inches.	Not longer than 72 inches.	"	Base	1	2	3	4	6	8	9
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	4	5	7	9	—
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	6	9			—
	Longer than 120 inches.	"	1	3	6					—
Wider than 48 ins. but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	5	7	9	11	—
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	7	10			—
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					—
	Longer than 120 inches.	1	2	4	8					—
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					—
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10					—
	Longer than 120 inches.	1	3	8						—
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						—
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						—
	Longer than 120 inches.	3	5	9						—
Wider than 108 ins., but not wider than 120 ins.	Not longer than 120 inches.	4	6							—

The longest dimension in any sheet shall be considered at its length.

CIRCLES, 8 IN. DIAMETER AND LARGER, SEGMENTS AND PATTERN SHEETS, advance per pound over prices of Sheet Copper required to cut them from ..... 3c.

CIRCLES LESS THAN 8 IN. DIAMETER, advance per pound over prices of Sheet Copper required to cut them from ..... 5c.

COLD OR HARD ROLLED COPPER, 14 oz. per square foot and heavier, advance per pound over foregoing prices ..... 1c.

COLD OR HARD ROLLED COPPER, lighter than 14 oz. per square foot, advance per pound over foregoing prices ..... 2c.

COLD ROLLED ANNEALED COPPER, the same price as Cold Rolled Copper.

ALL POLISHED COPPER, 20 in. wide and under, advance per square foot over the price of Cold Rolled Copper ..... 1c.

ALL POLISHED COPPER, over 20 in. wide, advance per square foot over the price of Cold Rolled Copper ..... 2c.

For Polishing both sides, double the above price.

The Polishing extra for **Circles and Segments** to be charged on the full size of the sheet from which they are cut.

COLD ROLLED COPPER, prepared suitable for polishing, same prices and extras as Polished Copper.

ALL PLANISHED COPPER, advance per square foot over the prices for Polished Copper ..... 1c.

ZINC—Duty, sheet, 1½c. per lb.	Cents per lb.
Carload lots, standard sizes and gauges, at mill	7.50 less 8%
Casks, jobbers' prices	8¼
Open casks, jobbers' prices	8¾

Metal Prices, June 9, 1913

PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

In effect May 1st, 1913, and until further notice.

To customers who buy over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.15⅝	$0.17¼	$0.18⅝
Wire	.15⅛	.17¼	.18⅝
Rod	.15⅛	.18	.19¾
Brazed tubing	.19⅞	—	.23½
Open seam tubing	.18¾	—	.21½
Angles and channels, plain	.19⅛	—	.22

50% discount from all extras as shown in American Brass Manufacturers' Price List No. 9.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring drawing and spinning brass	½c.	per	lb.	net	advance
" —Best spring, drawing and spinning brass	1½c.	"	"	"	"
Wire —Extra spring and brazing wire	½c.	"	"	"	"
" —Best spring and brazing wire	1c.	"	"	"	"

To customers who buy 5,000 lbs. or less per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.16⅝	$0.18½	$0.20
Wire	.16⅝	.18½	.20
Rod	.16¾	.19¼	.21
Brazed tubing	.21⅛	—	.24¾
Open seam tubing	.20	—	.22¾
Angles and channels, plain	.20⅝	—	.23¼

Net extras as shown in American Brass Manufacturers' Price List No. 9.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass	½c.	per	lb.	net	advance
" —Best spring, drawing and spinning brass	1½c.	"	"	"	"
Wire —Extra spring and brazing wire	½c.	"	"	"	"
" —Best spring and brazing wire	1c.	"	"	"	"

BARE COPPER WIRE—CARLOAD LOTS.

17c. per lb. base.

SOLDERING COPPERS.

300 lbs. and over in one order	21½c. per lb. base
100 lbs. to 300 lbs. in one order	22c. " " "
Less than 100 lbs. in one order	23½c. " " "

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ to 3½ O. D. Nos. 4 to 13 Stubs' Gauge, 20c. per lb.
Seamless Copper Tubing, 23c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron pipe Size	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb.	28	27	22	21	20	20	20	20	20	20	20	21	22	24	26	27

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

	Per 100 feet Brass.	Bronze.
⅜ inch	$8	$9
½ inch	8	9
⅝ inch	10	11
¾ inch	12	13
⅞ inch	14	15
1 inch	18	20
1¼ inch	22	24
1¼ inch	25	27
1½ inch	32	35
1¾ inch	45	48
2 inch	56	60

Discount 50 and 5%.

PRICE FOR TOBIN BRONZE AND MUNTZ METAL.

Tobin Bronze Red	18c.	net	base
Muntz or Yellow Metal Sheathing (14" x 48")	15½c.	"	"
" " " Rectangular sheets other than Sheathing	18c.	"	"
" " " Rod	15½c.	"	"

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bar in the rough, 25¼c. net.
German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.
Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturers.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Not over 18 in. in width, not thinner than 28 B. S. Gauge, 2c. above price of pig tin in same quantity.
Not over 35 in. in width, not thinner than 22 B. S. Gauge, 3c. above price of pig tin.

PRICE SHEET FOR SHEET ALUMINUM—B. & S. Gauge.

Gauge.	Width. Inches.	1 ton.	500 lbs.	50 lbs.	Less than 50 lbs.
20 and heavier	3-30	33c.	34c.	36c.	38c.
	3-30	34c.	35c.	37c.	39c.
21 to 24 inclusive	30-48	36c.	37c.	39c.	41c.
	48-60	39c.	40c.	42c.	44c.
25 and 26	3-30	35c.	36c.	38c.	40c.
	30-48	37c.	38c.	40c.	42c.
27	3-30	36c.	37c.	39c.	41c.
	30-48	39c.	40c.	42c.	44c.
28	3-30	37c.	38c.	40c.	42c.
	30-48	40c.	41c.	43c.	45c.
29	3-30	38c.	39c.	41c.	43c.
	30-48	42c.	43c.	45c.	47c.
30	3-30	39c.	40c.	42c.	44c.

The above prices refer to lengths between 2 and 8 feet. Prices furnished by the manufacturers for wider and narrower sheet. Charges made for boxing. F. O. B. Mill.

PRICE LIST SEAMLESS ALUMINUM TUBING.

STUBS' GAUGE THE STANDARD. SIZES CARRIED IN STOCK.

Outside Diameters. BASE PRICE, 24 Cents per Pound.

Stubs' Gauge.	Inches.	¾ in.	5-16 in.	⅜ in.	½ in.	⅝	¾ in.	⅞ in.	1 in.	1⅛ in.	1¼ in.	1⅜ in.	2 ins.	2½ ins.	3 ins.	3½ ins.	4 ins.	4½ ins.
11.	.120.	..	..	..	..	..	..	..	26	23	..	..	13	19	9	8	15	22
12.	.109.	..	..	..	..	..	..	..	25	..	..	..	14	..	..	..	..	..
14.	.083.	..	..	..	..	..	..	..	..	..	..	..	16	..	..	..	..	..
16.	.065.	..	..	..	..	..	27	26	26	23	22	20	20	20	20	26	30	50
18.	.049.	..	..	..	..	32	29	28	27	24	25	25	25	..	..	..	..	..
20.	.035.	116	..	45	38	33	32	31	29	28	29	29	29	30	37	48	57	80
21.	.032.	..	..	..	39	..	..	..	..	..	..	..	..	..	..	..	..	..
22.	.028.	137	97	47	41	37	36	34	33	..	..	44	..	..	..	..	..	..
24.	.022.	187	132	107	87	78	72	61	59	65	..	..	..	..	..	..	..	..

Prices are for ten or more pounds at one time. For prices on sizes not carried in stock send for Manufacturers' List.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

Diameter. B. & S. G'ge	000 No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price per lb.	33	33½	33½	34	34½	35	35½	36	37	38	39	44	47

PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

Per cent.	Price per lb.	Per cent.	Price per lb.
12	$0.52	16	$0.58
13	.53	17	.59
14	.54	18	.60
15	.55		

These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive. American or Brown & Sharpe's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 50%.

GERMAN SILVER TUBING.

4	per cent.	to	No. 19,	B. & S.	Gauge,	inclusive	$0.60
6	"	"	19,	"	"	"	.70
9	"	"	19,	"	"	"	.85
12	"	"	19,	"	"	"	1.00
15	"	"	19,	"	"	"	1.15
16	"	"	19,	"	"	"	1.20
18	"	"	19,	"	"	"	1.30

German Silver Tubing thinner than No. 19 B. & S. Gauge add same advances as for Brazed Brass Tube.
For cutting to special lengths add same advances as for Brazed Brass Tube. Discount 40%.

PRICES OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quantity and market conditions. No fixed quotations can be given, as prices range from 1c. below to 4c. above the price of bullion.
Rolled silver anodes .999 fine are quoted at 2½c. to 3½c. above the price of bullion.